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Value of Research to Manufacture

Specific Discussion of Investigations on Press and Die Design,
Quality of Sheet Metal and Welding Technique
on Steel Auto Body Manufacture

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YESTERDAY, looking into the window of a drug store, I saw a notice printed upon a box of absorbent cotton. It read as follows: "The cotton in this package has been made thoroughly absorbent by a process developed after years of exhaustive research."

I knew that statement was true.

How did I know it was true? Because the name of the manufacturer was that of a firm which has long held a high reputation for its medical supplies and because I have more than an inkling of the necessary part that research plays in the manufacture of most of the products civilization uses.

It is safe to say that almost no great manufacturing company was ever established without an initial and continuing program of intensive research. This is true unquestionably of such enormous organizations as General Electric Co., American Telephone & Telegraph Co., General Foods Corporation, General Motors, various steel corporations, and literally thousands of other technical or semi-scientific organizations. It is also true of the Budd company and every other progressive manufacturing concern in the automobile industry.

Ductile Tungsten An Important Example

The laboratories of practically all manufacturers are occupied chiefly with research devoted to three aims, as follows:

1. The development of new products.

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RESEARCH not only helps the manufacturer to keep his product ahead of competition, but opens new outlets for the main line or its by-products . . . Systematic experimentation on the materials in process improves their adaptability to rapid manufacturing, and the influence, extending back through the source of supply, spreads out into general industry. Investigation on mechanical equipment lightens the labor burden, promotes safety and reduces the overall cost . . .



2. *The improvement of old products.*
3. *The improvement of methods of manufacture of old products in order to better the products or reduce costs.*

Take, for example, the case of the lamp division of General Electric Co. Twenty years ago tungsten filaments were extremely brittle and prone to break upon receiving the slightest jar. It was, indeed, a serious problem for the makers of electric lamps and they placed great importance upon its solution. Finally a scientific laboratory worker discovered that the breakage of the filament was due to the fact that cleavages, much like those in diamonds and other precious stones, existed in the filament wire and ran, in most cases, completely across the fine wire. The slightest shock was sufficient to cause a separation of these cleavages and, hence, a breakage of the filament wires and the failure of the entire lamp.

The laboratory man went to work to remedy this situation and, after numerous experiments, he arrived at a very simple solution. He introduced into the metal of the wire some finely divided base material, much like ordinary earth, which, to express it unscientifically, set up a number of partitions or blank walls in the wire and broke up the cleavages. The result was the tough, long-lived tungsten filament of today, which will stand an astonishing amount of abuse.

Who can put into words the great benefit that this laboratory worker and the progressive organization behind him brought to humanity? Financially, he saved the millions of users of electric lights enormous sums of money

and he made it possible for his company to manufacture a product which has produced universal satisfaction and rich profit for its thousands of stockholders and agents.

Haphazard Experimentation Not Sufficient

Not long ago President Hoover, attending the Dearborn ceremonies in honor of Thomas A. Edison, said, "In making this, as in his other great inventions, Mr. Edison gave an outstanding illustration of the value of the modern method and system of invention, by which highly equipped, definitely organized laboratory research transformed the raw material of science knowledge into new tools for the hand of man."

"In earlier times mechanical invention had been the infrequent and haphazard products of genius in the woodshed. But science has become too sophisticated to be wooed in such surroundings. Nowadays a thousand applied science laboratories, supported by industries of our country, yearly produce a host of new inventions. . . . Our scientists and inventors are among our most priceless national possessions."

That was Herbert Hoover, the engineer, expressing appreciation in a matter concerning which he unquestionably has first-hand knowledge.

Let me mention here that the word research, as applied especially to large manufacturers, includes such matters as that of keeping workers happy, contented and efficient in their work, extensive and intensive investigations of production schedules, a detailed study of competition and a considerable number of other things. Of these I shall not have space to talk in this article. The research I shall discuss is of a more technical nature.

Technical Research Illustrated By Die Design

Technical research falls into two main divisions: (1) research affecting materials and (2) research affecting manufacturing processes.

Let us see how these things are worked out in the Budd company, which employs a maximum of 10,000 men and, when working at capacity, produces approximately 1,000,000 all-steel automobile bodies per year. To discuss only one element in production, take the matter of dies, on which the various body parts are stamped, shaped and trimmed before being welded together into complete all-steel motor car bodies. In our plant in Philadelphia we have over 600 presses, each of which must be fitted with specially designed dies, shaped to produce a certain small or large part of an automobile body. Our largest dies take a sheet of steel 66 x 103 in., and turn it into a complete side of a four-door sedan, with two door openings, a window opening, a raised molding, a depressed well for the rear wheel of the chassis to operate in, and other minor features. Of course, when this immense stamping, using the largest steel sheet ever rolled for automobile body use, comes from the first press it is not a completed product. There is a limit to the pressing strain which even a sheet of steel will stand, and the piece, after it comes from this first operation, must be further shaped, pressed and trimmed on other dies.

Die costs are made up of material, labor and maintenance. Before the dies are made investigations are conducted which determine that combination of materials which gives greatest service at the lowest first and maintenance cost. This requires that cast irons of special analysis be devised and that castings be made under con-

ditions which will produce the most favorable structure. Tool steels must also be selected to produce low cost service, and so prepared in manufacture that little or no distortion occurs in hardening to the maximum degree. Use must be made of the newer methods of producing wear-resisting surfaces by the use of chromium plating, cloudburst hardening and nitriding wherever die materials so treated appear to promise cheaper and better service. All of this with no loss in precision, for steel body stampings must be free from marks or irregularities produced by the dies.

In the effort to reduce die maintenance cost we have endeavored to select those materials which would best resist wear when used in dies. To further reduce this cost we have studied and developed drawing compounds which greatly increase the life of the dies and save the stampings from marks and scratches usually incidental to the forming operation.

Not satisfied with existing safety devices on our presses we have developed a new type of our own which promises to be much more satisfactory than those previously in use.

Much Study Given to Sheet Metal

Sheet steel is carefully selected to suit various special purposes. Difficulties and failures which arise in the manufacturing operation are investigated by the laboratory and recommendations made with a view to eliminating the trouble. Such investigations, carried out in co-operation with the manufacturers of sheet and strip steel, have assisted in the development of products which are much more certain in performance when subjected to difficult operations. The different steps in the manufacture of sheet and strip steel have been investigated and the influence of these steps on the performance of the product noted.

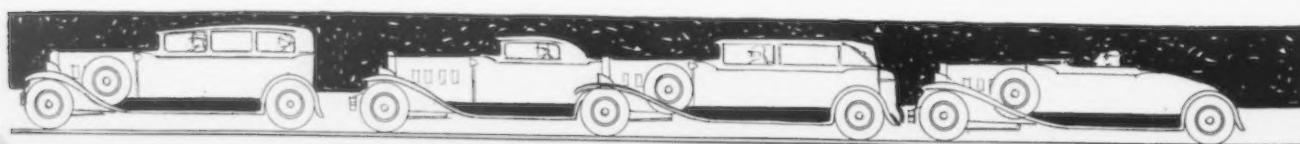
It has been found, for instance, that for certain stampings the metal must be rolled and annealed in definite ways and the grain size as shown by microscopic examination together with the physical properties as determined by test must measure up to predetermined standards, or failure will follow an attempt to give it deep drawing.

A characteristic and inherent defect in sheet metal is known as stretching strains. These appear as slight depressions in the otherwise smooth metal surface. Former remedies or preventive measures consisted of further cold rolling, but this caused a sacrifice of ductility. Another device was that of roller leveling, but that failed to work with uniform success. Happily we have developed a mechanical device which so treats the sheet as to prevent stretcher strain formation and it does it without reducing the workability of the metal. This permits a better finish at lower cost.

Large Sheets and Welding Reduces Number of Parts

The stampings themselves must be so designed that the blank when laid out on the sheet will give the maximum useful areas in the parts cut away. By suitable welding or clinching these pieces must be utilized in other parts of the body. A constant effort is made in our plant to maintain the most economical ratio of waste to usable material in every sheet. Those parts which are too small for use in major automobile body parts are worked over in a special department to recover such areas as are useful in making small metal brackets and reinforcements.

The methods of joining pieces of metal together have



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been brought to a high state of perfection in the Budd plant.

For irregularly shaped blanks, two sheets may be welded together, in that way avoiding the purchase of a large sheet with its attendant waste. The process used here is flash welding and, by perfecting the methods of finishing, the welds become almost invisible and are of a strength equal to that of the original metal. Flash welding is applied to formed pieces as well as to flat sheets, resulting in the production of units consisting of a single piece of metal. Thus cowls are made in one piece and even the two sides and back panel of a car are so joined that the body consists of a single piece of metal from the right front post, around the back to the front post on the other side.

Spot Welding Extensively Used in Final Assembly

Spot, flash, arc and gas welding are also employed to join several small pieces into a unit, spot welding being extensively used in the final assembly. We have studied its design and operation, standardizing replacement parts and by modifications in design increased the output of the machine appreciably. At the same time we have studied those conditions which contribute to the uncertainty in spot welding and which are responsible for the bad repute in which the operation has been held and have reduced it to one in which the welds that are produced are in all cases perfect.

In the foregoing paragraphs I have covered only a

very small part of the research conducted in the manufacture of Budd automobile bodies. This research follows the product through all the various processes, from the design, analysis and specifications of raw material to the complete body after it has been placed upon the chassis and is out on the road.

Much experimental work in deciding on the number and function of the dies, and the most efficient application of the conveyor principle of assembly are all part of the work; if the research is not actually in the laboratory, then it is by special investigating groups. The Budd company in 1929, for example, installed over three miles of new conveyors which, despite their cost, have already proved themselves a distinctly worthwhile economy. Tests showing the longevity of all-steel bodies, their safety, balance and silence are other factors calling for intense and progressive research. This has called for the creation of a special machine capable of giving most rigid tests simulating actual road conditions to our steel bodies and their individual parts so that we have been able to discover and remedy weakness before the bodies go into actual manufacture.

It is only fair to say that because the Budd company has maintained the most scientific and continuous manufacturing research, upon which it is constantly spending much time and money, that there are approximately 6,000,-000 of its all-steel bodies now in use in the United States and it is receiving an ever increasing acceptance from car makers and from the public.

Too Liberal Spacing in Group Patterns for Small Castings

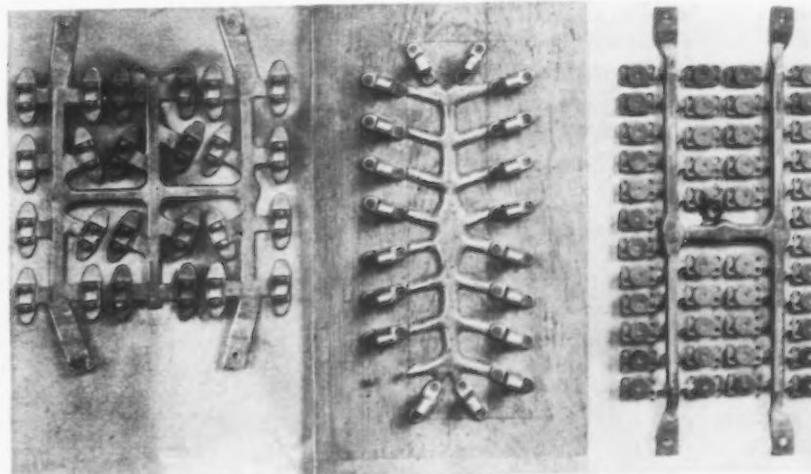
IT is a common characteristic to find pattern makers who have been accustomed to work with heavy sections to be too liberal with the space which they allow between small patterns, says J. D. Judge, works engineer, Hamilton Foundry & Machine Co., Hamilton, Ohio. Spacing, arrangement, gating, molding, size, etc., are all factors affecting the ultimate cost of castings. They are all equally important and no one should be disregarded.

He offers the photograph, here reproduced, as a clear example of inefficient spacing and arrangement. Two gates of similar patterns, properly spaced, are arranged on each side for comparison. From these illustrations, the wastefulness of the design for the central equipment, he adds, must be apparent. The facts are this equipment was never used, as the casting buyer was convinced that regating was well worth the extra cost.

Good pattern equipment, urges Mr. Judge, offers larger opportunities for saving in production costs than many other types of equipment. "Manufacturing establishments that take pride in their new and modern machine tools, cranes and other

labor saving equipment," he continued, "should not continue to have their castings produced from poorly designed or wornout patterns that waste a large part of the savings made from their other modern production tools. This condition may have been brought about by the fact that casting production equipment is something which the owner ordinarily comes in contact with only infrequently. It is also probably true that lack of interest on the part of the owner in the condition of his own property encourages a similar state of mind on the part of foundrymen."

The establishment that is working closely with its casting source, cooperating in periodical inspections of equipment and consulting on new designs, is finding the procedure, in the opinion of Mr. Judge, a most profitable one indeed. "The manufacturing establishment which is giving the same consideration to its pattern equipment that it gives to its plant equipment is being paid excellent dividends in the way of reduced costs and advantages which its competitors do not have."



In the Center of the Group Is a Pattern with Undue Spacing; Those Flanking Are Regarded as Satisfactory

Destruction of Galvanizing Pots

Examples Under Practical Conditions Show the Why
and Wherefore—Segregation, Overheating
and Mechanical Defects Chiefly at Fault

BY WALLACE G. IMHOFF*

DESTRUCTION of galvanizing pots under practical operating conditions deals with so many factors that, unless definitely organized, it is difficult to reach any specific line of action to meet future failures. A few questions properly answered will help to concentrate thought upon this important matter. These questions are—

1. What pots fail?
2. Where do pots fail?
3. How do pots fail?
4. When do pots fail?
5. Why do pots fail?

No Pot Is Immune from Failure

ALL pots eventually fail, and no two pots fail in exactly the same place. However, two definite answers can be made to this question: Kettles which have a poor steel base will fail quickly; and kettles which are overheated will fail quickly. This answer immediately raises other questions: "What kind of steel is a poor steel base?" and "When and how are kettles overheated?"

Such a discussion begins in the still further question, "What kind of steel is used for galvanizing pots?" Since this discussion is entirely on the practical phases of galvanizing pot destruction, suffice it to say here that galvanizing pots are made of firebox steel and flange steel. Definite specifications for these two steels have been set by the American Society for Testing Materials. These specifications are issued under the fixed designation of A 30 and the final number indicates the year of original adoption as standard, or, in the case of revision, the last year of revision. Adopted, 1901; Revised, 1909, 12, 13, 14, 16, 18, 21, 24.

These specifications show what the steel should be. Many kettles have failed, and the answer which came back was that the steel when tested met these specifications. The question always is, "Why did it fail?" A knowledge of steel making is required to answer this question. It usually can be traced to three definite causes in steel making:

1. Segregation.
2. Oxidation.
3. Mechanical defects.

Segregation and oxidation are chemical and metallurgical reasons; mechanical defects come from rolling and handling in making the solid metal into very large plates. It is thus seen that the plate may pass both chemical and physical tests and still have a part of it show a defect due to one of the above three causes. Each one is a big field for discussion. Suffice it to say here that the composition and character of the steel base should be closely scrutinized in pot failure. The chemical composition and the quality of the steel are factors which

sometimes are the direct cause of a long, or a short, pot life.

The next question is, "What is a good chemical composition for the steel for galvanizing pots?" A quick answer would be, "One that meets the specifications." But practical galvanizers know that many pots which fail in practice do not meet these specifications. For example, here is one, the analysis of the steel base of which showed 0.12 per cent carbon, 0.40 per cent manganese, 0.012 per cent phosphorus, 0.030 per cent sulphur.

This is well within the specifications, so that the question still can be asked, "Why did it fail?" The life of this pot was short in comparison with the usual pot



FIG. 1—Zinc-Iron Alloy from Inside of Kettle Side Near the Top. The character of the alloy shows a low temperature. Note that the alloy is thin, also

under similar conditions. The practical conditions found indicated the cause of the failure to be—

1. Segregation in the steel base.
2. Localized overheating.

Another pot which failed showed the following chemical analysis:

Carbon	0.096 per cent
Manganese	0.411 per cent
Phosphorus	Trace
Sulphur	0.027 per cent
Silicon	Trace

Evidence of segregation in this pot is shown by an analysis of the steel made at the point of failure, which gave:

Carbon	0.158 per cent
Manganese	0.445 per cent
Phosphorus	0.018 per cent
Sulphur	0.041 per cent
Silicon	Trace

It is extremely interesting to compare the chemical composition of the steel in these two pots, which failed

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FIG. 2—Zinc-Iron Alloy from the Inside of the Kettle Side, About a Foot Lower Down Than the Alloy Shown in Fig. 1. Note how the increase in temperature has affected the character of the alloy

quickly in service, with that of a pot which lasted for three years. The analysis of the steel in this latter pot is given below:

Carbon	0.13 per cent
Manganese	0.45 per cent
Phosphorus	0.011 per cent
Sulphur	0.068 per cent
Silicon	0.01 per cent
Tungsten	None
Nickel	None
Chromium	0.03 per cent
Vanadium	None
Molybdenum	None

It is only fair to state that the first two pots had a production of much greater tonnage than the last example. This, however, does not tell why these other kettles did not give the same service as the other pots doing the same work. It would require too much time to go into the discussion of this particular phase of the practical destruction of galvanizing pots. The whole matter will be dismissed by saying that there are four distinct reasons for pot failure which cannot be very well covered in any set of specifications. The four additional factors which a steel should have, in addition to meeting the required specifications for this kind, are—

1. The steel should be sound.
2. There should be no segregation in the steel.
3. The steel should be thoroughly deoxidized, and



FIG. 3—Zinc-Iron Alloy Still Farther Down, and Just Above the Zone of Extreme Heating. Note the character of this alloy, as developed by still greater heat intensity

teemed at the proper pouring temperature.

4. The steel should not have any mechanical defects in it due to rolling, or handling from ingot to plate form.

Overheating of Pots

"WHEN and how are pots overheated?" This question may be answered definitely in a number of ways, which are—

1. In starting up a new furnace.
2. By accident, or carelessness, such as at night.
3. Deliberately, in times of prosperity, by overproduction.
4. By getting out rush orders.
5. Deliberately, by guessing the metal temperature instead of using a pyrometer.
6. By poor furnace design.
7. By having too small a metal capacity.
8. By the method of heating the pot.
9. By having too small a heating area.

It is not uncommon to find a galvanizing kettle which has failed in three days, in two weeks, in eight weeks, in

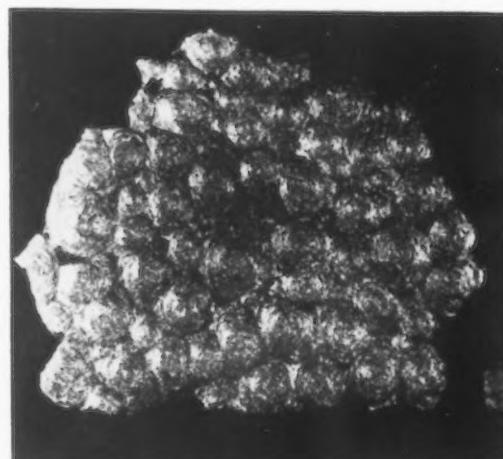


FIG. 4—Zinc-Iron Alloy in the Upper Zone of Extreme Heating Area and High-Heat Intensity. Note the increased thickness of the alloy formed, as shown in the small piece of alloy at lower right. All pictures are reduced one-half in size

three months, in four months, in six months—in fact, almost any time one may set. The difference in kettle life is caused by many different things. A very common cause of a short kettle life is in the method used to start the new kettle.

Starting from slab zinc packed in the pot is the severest test perhaps upon the pot, although even in this respect results have varied widely. For example, not long ago it was stated by the owner of a very large kettle that a pot which had been melted in in 18 hr. had given a better life than the previous one, in which 48 hr. had been required to melt in.

Overheating at night has often been the direct cause of pot failure. Only one who has actually looked after the heat on a galvanizing furnace can appreciate how hard it is to keep from overheating the pot. This is especially true where the night watchman is also fireman.

The damage which is done is properly illustrated by a pot with absolutely new metal in it and which had not had a pound of production put through it, which accumulated 4400 lb. of dross by overheating for 4 hr. up to 1100 deg. Fahr. The iron to form this dross was derived entirely from the pot, since no material had been galvanized in it.

Dissolving, by the action of the zinc, of the steel side

of the pot becomes extremely rapid at high temperatures. If this is continued for any great length of time the iron will be dissolved completely through the pot. Increasing the thickness of the pot side is not a remedy for overheating. It just requires a little longer to dissolve the heavier side, that is all. The same results are obtained by either accident or carelessness, when the metal is overheated.

In times of prosperity some pots are continually overheated to get out the production. This is excused by

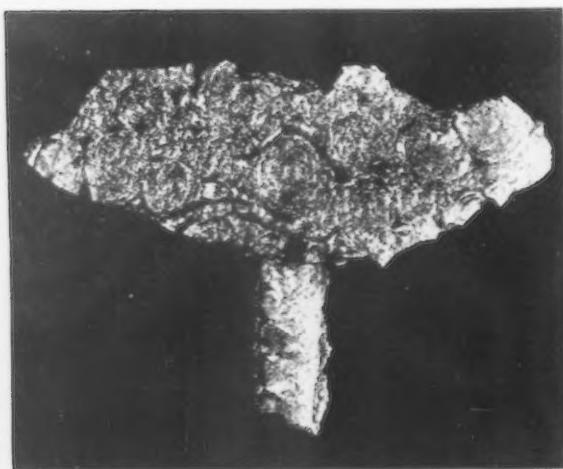


FIG 5—Zinc-Iron Alloy in Lower Zone of Highest Heat Intensity. Attention is called to the still greater thickness of the alloy, which at this point is almost an inch (lower section)

saying the price of the pot per pound of production obtained is very low. But this does not change conditions in any way, since the pot life is subject to definite laws and principles. The pot may stand continued overheating for some little time. On the other hand, it may fail very quickly, giving an extremely short and costly life.

In times of rush orders the pot may be fired quickly. There is nothing so hard on a pot as extreme variations of heat. The shorter the time, and the wider the variation of heat, the greater the damage done. The best conditions are those of uniform heating with a minimum temperature variation. This also gives better fluxing conditions and will tend to produce a higher quality product.

Many plants still allow the pot to be operated and controlled by a practical galvanizer who is considered good at guessing the metal temperature. In such plants any attempt at knowing is scoffed at, and it is considered a mark of inferiority not to be able to guess the temperature. In other industries guessing has been eliminated to a large extent. It eventually will be entirely eliminated in the galvanizing industry, as the view is gradually becoming general that it is extremely costly to guess. Not only is the pot life shortened, but also the dross production is increased, and the quality of the coating lowered.

Only recently has the matter of galvanizing furnace design become of importance. For over 50 years the industry got along very well with the old coke-fired pots with small fire-doors on each side. With zinc at 7c. a pound, the dross made up of 96.5 per cent zinc, the loss by overheating soon mounts up in money value. It is not uncommon to find operating galvanizing kettles producing 50 per cent of dross alone. The furnace design may reduce this dross to much less than half of this quantity. Pots in which large quantities of dross are produced are usually pots that are overheated. A poor furnace design is the basic cause of the overheating.

The design of galvanizing furnaces should take into

account the metal capacity in relation to the desired production. Many pots are quickly burned out, owing to the fact that the metal capacity is far too small in relation to the production being put through. The smaller the metal capacity and the higher the production, the higher the dross and the shorter the pot life. There is a definite relation between the quantity of heat that must be supplied in a given unit of time and the metal capacity and the production. If these three factors are not correctly balanced, the kettle will lose temperature rapidly, the dross will accumulate in large proportions, and the pot will fail after a few months' operation.

The method of heating may vary widely, even when the same kind of fuel is used. For example, on coke-fired pots the fire-box width varies from 6 in. to 12 in. The size of the draft doors and their number also vary, as well as the size of the coke used as fuel. These factors seem unimportant; but they are extremely important, as anyone with practical experience with coke fires will testify. Also, when gas is used as fuel, the method of designing the combustion chamber, the number, size and location of the burners, the type of burner, the size of blower used, etc., all influence the kettle life.

The relation of heating area to total area also is of great importance in pot life. In most pots the actual heating area, through which the major part of the heat is received, is extremely small in proportion to the total area which may be heated. As a particular example of this condition may be mentioned the small area on coke-fired pots directly in front of the fire doors. Most of the heat is received directly in front of, and slightly above, these small draft openings.

Pots Fail at Any Overheated Point

The second question, "Where do pots fail?" may be answered by saying, "Anywhere; wherever overheated." Practice shows that some pots fail at the dross line, some fail at the top, some fail in the middle of the sides, some at the bottom, and some on the corners. It all depends on how they are heated. Failure, however,

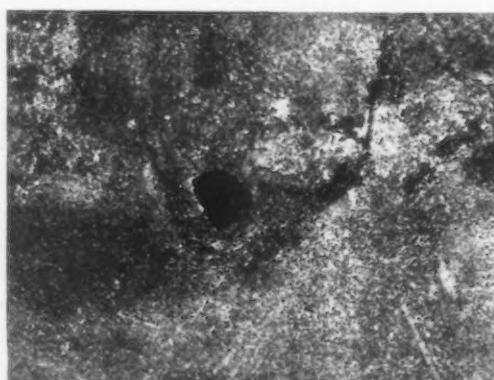


FIG 6—Final Destruction of a 2-In. Fire-Box Steel Side

usually occurs due to overheating. This statement is made in the sense of knowing that segregations and impurities will cause quicker destruction than good sound metal.

Examples of How Pots Fail

The third question, "How do pots fail?" is best answered by illustrations from a full-sized pot which did fail. Fig. 1 shows some of the alloy from the inside of the pot at the top of the side. The temperature in this particular pot at the top was very low, due to the method of firing. It was a coke-fired kettle with eight fire-doors on each side. These openings were very small in proportion to the size of the pot and body of metal to be heated.

This shows clearly the result of overheating the side

of the galvanizing pot, and how the destruction is brought about in practice. The cause of failure is high concentration of heat over a small area on the side, which stimulates the dissolving action of the molten zinc upon the side. The point of failure is at the dross line and is largely due to the fact that there is little or no circulation of the metal at this point to carry off the high heat intensity from the coke-fire directly on the other side of the steel plate.

Some pots fail at the dross line, some at the top of the side, some in the middle of the side, and still others at the corners. The underlying cause of failure in almost every case is found to be localized concentration of high heat intensity on a small area of the steel side.

Answer to the next question, "When do pots fail?" is, "any time; as soon as the dissolving action of the zinc progresses entirely through the thickness of the side of the pot." One pot failed from sliding in the slabs of metal. The side was already thin, when a slab pushed in hit a thin section on the opposite side, and knocked a hole in it.

Pots fail any time. Another failure occurred at night and, before anyone could get to it, the contents of the kettle had run out into the pit and around the fire-box. It took three weeks to get all the metal cleared up.

The answer to the question, "Why do pots fail?" is left for another time to be discussed as, "The Theory of Galvanizing Pot Destruction."

Vanadium Steels Used for Railroad Equipment

At the annual meeting of the American Society of Mechanical Engineers held in New York during December, 1929, Charles McKnight led a discussion of the subject "Alloy Steels in the Railroad Field" (briefly reported in THE IRON AGE, Dec. 12, 1929, page 1592). Major G. L. Norris of Vanadium Corporation of America contributed a discussion of vanadium alloy steels to that same meeting. After noting the increasing tonnage of alloy steels going into railroad service, primarily because of their enhanced strength, Major Norris said that nearly all the failures investigated by him were due to such things as tool marks, sharp fillets and faulty lubrication. Very seldom is the quality of the material inferior.

Vanadium is used in 90 per cent of the alloy steel locomotive forgings and castings, not to deoxidize the metal (as has been often stated), but for its alloying qualities after the deoxidation has been accomplished by cheaper and more powerful deoxidizing elements, such as silicon and aluminum. It imparts fine grain size and improved strength. Steels containing vanadium in appreciable amounts, sometimes even as low as 0.05 per cent, show less dendritic segregation than do vanadium-free steels, almost complete freedom from Widmanstättian patterns in the microstructure after casting and before thermal or mechanical treatment, and are characterized by unusually fine grain, which they retain at higher temperatures.

Vanadium has a strong chemical affinity for carbon, and when it is present the iron carbide is strengthened and hardened, shows less tendency to coalesce or form into large masses, and tends to remain in the sorbitic condition. Therefore, segregation of carbides is less common in vanadium steels, and lamellar pearlite does not readily occur at ordinary rates of cooling. This tendency of vanadium to form sorbitic pearlite, even in large forgings, is a unique and valuable property.

Major Norris said these metallurgical and chemical characteristics are responsible for the increased strength and elastic ratio of carbon-vanadium steels, without materially lowering ductility. Shock resistance, endurance under reversed stresses, resistance to abrasion and response to heat treatment are all improved.

Troubles encountered by railroad men with quenched and tempered forgings, in his opinion, are due to inadequate heat-treating equipment and experience, and for this reason primarily the alloys suitable for use in the normalized (or tempered and annealed) condition were developed. By this treatment no unrelieved quenching strains are left in the forgings, and physical properties are obtained practically equal to those by a mild quench and tempering treatment.

Typical physical properties of normalized and tempered

or annealed carbon vanadium forgings are shown on the first line of the adjoining table.

Exception was also taken to Mr. McKnight's figures for minimum requirements for normalized and tempered alloy castings, as shown on the second line of the table. According to Major Norris, the minimum specifications shown on the third line are easily met by carbon-vanadium castings having average properties as shown on the fourth line of the table. Even higher ductility can be had from nickel-vanadium castings (see last two lines of the table).

Tensile Properties					
Yield Point, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elonga- tion, Per Cent	Reduc- tion in Area, Per Cent	Chemical Analysis	
Normalized carbon-vanadium forgings	65,000	97,000	24	45 to 52	
Minimum tensile properties of large alloy steel castings, normalized and tempered, according to McKnight	45,000	80,000	25	45	Carbon 0.30 to 0.40 Manganese 1.0 to 2.0 Vanadium 0.18 or Nickel 1.5 to 3.0
Minimum for carbon-vanadium castings, according to Norris	55,000	85,000	22	40	
Average values to be expected of above (Norris)	57,000	90,000	24	47	
Minimum tensile properties of large nickel-vanadium steel castings, heat treated	55,000	....	25	50	Carbon 0.20 Silicon 0.35 Manganese 0.80 Nickel 1.50 Vanadium 0.10
Average values to be expected from nickel-vanadium castings	59,000	....	28	58	

Limitations of Welding on Aircraft

In view of the extreme exactitude which governs the design and construction of an airplane, there are many features of welding that while permitted in other industries are prohibited in the manufacture of aircraft, said Charles E. Kirkbride, Naval Aircraft Factory, Philadelphia, in an address before the recent meeting of the International Acetylene Association. Edge welding is avoided as this is one of the most prolific sources of cracked welds known. The joint should not be loaded with surplus metal, as this only means more weight and gives a better chance for cracking. Tension welds are avoided if possible. Two welds are not made too close together in thin gage material because there is not enough metal available for proper stretching to meet the double shrinkage, and cracks will result. Both sides of a thin sheet should not be welded unless absolutely necessary. The practice of filling holes with weld is also discouraged.

Management Movement in Japan

Increasing Numbers, the World Engineering Congress
Proved, Are Studying Scientific Principles—Fear
of Resulting Unemployment a Deterrent

BY DR. LILLIAN M. GILBRETH*



Dr. L. M. Gilbreth

ment Group, made an excellent presiding officer, having both experience on the job and boundless energy and enthusiasm.

The set-up was excellent—a good blackboard with equipment and pointer, table long enough to provide ample room for chairman, secretary, and assistants, an ample supply of abstracts of the two papers, efficient rules of order, etc. The one lack was coat room service, which meant storing and moving of hats and coats as the room filled. The meeting started on time, thanks largely to the most efficient secretary, Mr. Araki, to whom Section XII, the management division, owes much.

He is an engineer engaged in efficiency work, whose knowledge of English, ability to translate easily, fluently, and most acceptably from Japanese to English, or vice versa, energy, sense of humor, and ability to sweep aside non-essentials with a cheery "not necessary," were invaluable.

Equally cooperative was Mr. Ueno, also an "efficiency expert" and a leader in industrial psychology, well known in the United States and in Europe because of his visits, and his writings, and as the organizer of the Taylor Society in Japan.

A paper on "Scientific Industrial Management," by L. P. Alford, was most effectively presented by Prof. J. W. Roe, New York. The room at this session, and at all that followed, was crowded with members and guests, the larger part of whom were Japanese. Many of these were students from the univer-

* Special correspondent for THE IRON AGE to the World Engineering Congress in Japan. Dr. Gilbreth's impressions of the congress were given on page 223 of the issue of Jan. 16.

THE scientific management division of the World Engineering Congress, Tokio, began Wednesday morning, Oct. 30, in a rather small room rather remotely located. Excellent visual devices—signs, arrows, marked plans—supplemented by guides whose language facility was exceeded by the willingness to help, got Japanese and foreign members there easily. Dr. Mauro, president of the International Scientific Manage-

sities and technical schools and evinced marked interest.

Touches on Technological Unemployment in Japan

The discussion was opened by Dr. Schlessinger, of the Technische Hochschule of Berlin. He had been for some time visiting Japanese plants and made some drastic criticisms of what he had seen, but in a most kindly and constructive fashion. He spoke of noticing in the factories of Japan, crowding, machines rusting, labor cheaper than machine tools. He saw need for better buildings, especially in the smaller shops, also need for equipment. He noted too many workers for the jobs done; in one shop of 2000 workers there were 200 more than would have been needed in Germany. Apparently the surplus workers could not be dismissed.

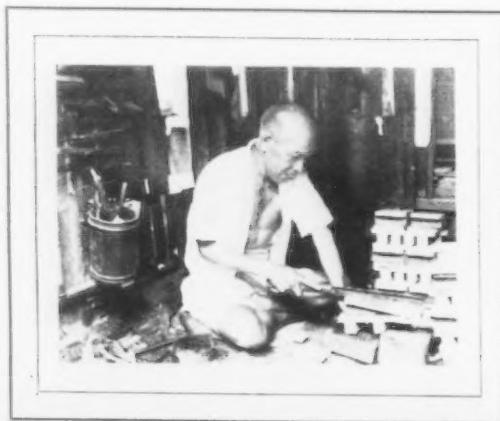
He felt that scientific management is needed, but that it must be followed through, adequate output insisted on, and the resulting unemployment of the dispensed—with workers accepted as necessary, during an interim period at least. This raising of the problem of technological unemployment seemed likely to lead to a heated discussion, which was postponed to a later session.

The second paper, "Development and Trends in Standardized Quality Production," by Mr. Van Deventer, was read in abstract, the Japanese who read it revelling in the job. As there were many more Japanese than all the other nationalities combined, it was early and wisely suggested to keep the Japanese group always in touch with procedure, even at the expense of the rest of us. English discussion was translated verbatim into Japanese, but Japanese into English only in brief substance, when asked for. Abstracts, charts, blackboard illustrations, etc., did much to keep us in touch.

The second session came on the next morning. I was chairman, an easy job, as Mr. Araki had all in order, even to special procedure when Prince Chichibu, who was visiting all sessions, should come to ours. Dr. Mauro presented the two listed papers as one—his own, on "The

Movement for Rationalization in Europe," and that of his colleague, L. Palma, on "Theoretical and Practical Aspects of Science Organization in Italy." Both presented the problem of technological unemployment as of paramount importance, and in general were in agreement with Prof. Schlessinger's argument of the day before, that every worker be urged to maximum efficiency and output, no matter if this meant increased unemployment for a time.

Mr. Spacek, of Czechoslovakia, and our Prof. Roe stressed the need of adapting the appli-



cation to the specific situation. They held that finding employment for workers displaced was an important part of the work of scientific management. Mr. Araki said he thought this could be done in Japan, and told how the jinricksha men, out of jobs, as autos displaced the jinrickshas, were trained to be chauffeurs.

The third session was on the morning of Friday, Nov. 1. The first paper was by Ordnance Vice Admiral Godo, on "Some Experiences in Scientific Management of Marine Shops," and was excellent in subject matter and in presentation. It dealt in detail with forms and mechanisms of management, route sheets, etc. It was illustrated by charts and blackboard work, easy to follow, though all in Japanese, and aroused a long and detailed discussion, all by Japanese in Japanese. This was most interesting, as it proved that the mechanisms of scientific management are known and in use by Japanese engineers. Students, as well as practising engineers, followed easily and attentively.

Without detailing succeeding sessions, the chief contribution to Section XII of the congress was made, from the standpoint of advances in technic of scientific management, by doctors of medicine and doctors of philosophy, not by engineers. The latter furnished "case" illustrations and "progress reports," significant, interesting, but not new, except for the added emphasis on technological unemployment. The others dwelt on psychological matters and problems of metabolism among workers.

It was most interesting that so many Japanese (many more than could be seated at each session) followed the program with deep attention, interest and understanding. Their presence, discussion and reactions showed:

1. An acceptance of the principles of scientific management.
2. Stress on research.
3. Acceptance of the "machine age."
4. Fear of technological unemployment.

As for the foreign delegates, these, like the Japanese, were most agitated over the question of technological unemployment. There was not time to discuss job analysis, and determination of job specifications and personality analysis and the determination of personality specifications as a remedy for unemployment. This was unfortunate as the Japanese have great aptitude for such work.

In the many lectures given by Prof. Roe and myself, often as consecutive talks before the same groups, we had an opportunity to discuss the industrial revolution, its effect on unemployment and the technic of scientific management, especially motion study, as it affects employment and unemployment. So that it is to be hoped that those most interested in management in Japan realize that it is the aim of scientific management to prevent, not increase unemployment.

We found much interest in scientific management in Japan. The largest organized group consists of members of the various engineering societies who have formed a group very like the management section of the



American Society of Mechanical Engineers, except that it is open to civils, mechanicals, mining and electricals who are interested in management problems.

The Institute of Industrial Efficiency organized by Mr. Ueno has also engineer members but is open to psychologists, doctors, executives and others interested in management especially as it affects the human element.

The Association for the Efficiency Promoting Movement is under the direction of one of the popular newspapers, the *Hochi-Shimbun*, Tokio. The lectures sponsored by this association are open to the public and attract large audiences.

It was my privilege to meet the leaders of all three associations. The engineering group is anxious to spread scientific management throughout Japan—cooperating with the other groups but keeping the leadership in the hands of the technically trained engineers.

The "efficiency" group feels that the chief need is consideration of and preservation of the human element, so, while glad to admit engineers to membership, emphasize the leadership of those trained in human sciences.

The "efficiency promoting" group hopes to do extensive education and to popularize the movement.

The situation is not unlike that in the United States—possibility of duplication of effort, yet so much still to be done that one hesitates to suggest amalgamation. As here, we must hope for cooperation among the different groups, and taking over of suitable activities by each group, according to its fitness.

The consultants have, several of them, visited Europe and the United States, have studied the literature carefully, have in some cases translated or revised the standard works. The younger men are being sent over for training in American colleges and industry.

The chief needs are, on their part, longer study here, a realization that the installation of scientific management is not a "white collar job" and the development of a procedure adapting the technic to the specific problem. Of course these are also the chief needs in this country.

Management engineers from foreign countries are given every opportunity to see in Japan what is being done and will be increasingly invited to lecture on expert work done by Japanese management men. But there is a feeling that Japanese industry and business should be systematized by the Japanese. It is certain that Japan as a nation is interested in more efficient management, is studying and applying as fast as she can and will ultimately both introduce scientific management into her own activities and make contributions to its technic to be used everywhere.



It is especially interesting and significant that so many Japanese are applying the principles of motion economy to their own work programs. There is as yet no training in scientific management in the technical schools or universities. Courses are being planned and every visitor from the management field is urged to devote all his time to give lectures.

Conveyors Aid Production Problem

Pump Manufacturer Increases Output by Better Use of Plant Facilities, Rather than Expansion of Floor Area

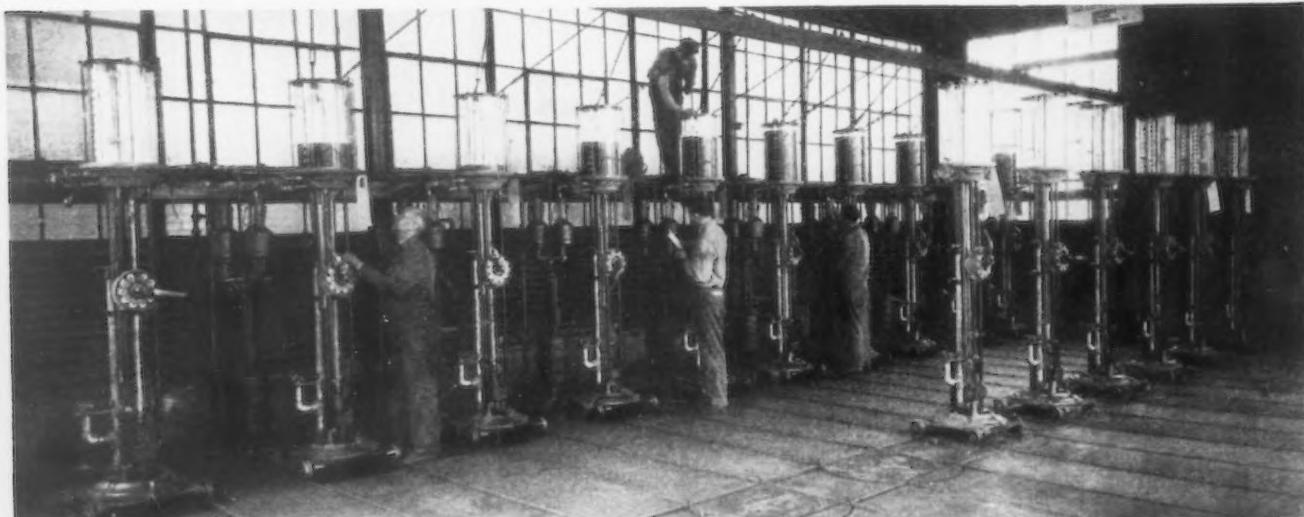
FACTED with the necessity of increasing production to meet increased demand for its products, the Dayton Pump & Mfg. Co., Dayton, Ohio, manufacturer of gasoline pumps and water pumps, decided to solve its problem by more efficient use of its plant facilities, rather than expansion of floor area. Consequently it has recently rearranged its factory so as to eliminate waste space and has installed a comprehensive conveying system for handling materials.

Gasoline pumps, the company's main product, are assembled along a conveyor line which begins at the west end of the plant and progresses directly to the east end, the only deviation being a journey to the calibrating room, which is housed in a separate structure. Incidentally, the isolation of the calibrating room from the main building

possible, a wooden platform, about $5\frac{1}{2}$ ft. high, has been constructed along the assembly line at station D. Workmen standing on this platform are located at the right height to place the glass measuring tank on the pump. Tanks are stored on a balcony adjoining the platform.

Moving Into Calibrating Room

After the tanks have been assembled, the pump, still on the small truck, is moved by hand to a turntable in the track, where it passes on to a side track leading to the calibrating room. Known as station E, the calibrating room is so interwoven with tracks and turntables that pumps can be transported to any point desired. It is here that pumps are moved by hand on to a measuring station and are connected to an underground storage tank. In



CALIBRATING Room, Where Adjustments for Measurements Are Made, Is Interwoven with Tracks and Turntables So That Pumps Can Be Transported to Any Point Desired

is a legal stipulation, to prevent danger from fire or explosion.

Assembly work begins at station A along the conveyor line. The cast iron base of the pump is placed by hand by a workman on a small flat four-wheel truck operating on a track built into the floor. The pump remains on the truck until after it has been tested in the calibrating room.

At station B the pumping unit is added. This unit previously has been assembled separately and has passed a rigid mechanical inspection, as well as a practical operating inspection, during which it is subjected to a gasoline test more severe than the hardest actual usage. This prevents faulty pumping units from going into assembly, only to be discarded at the final test, after the pump has been completely built.

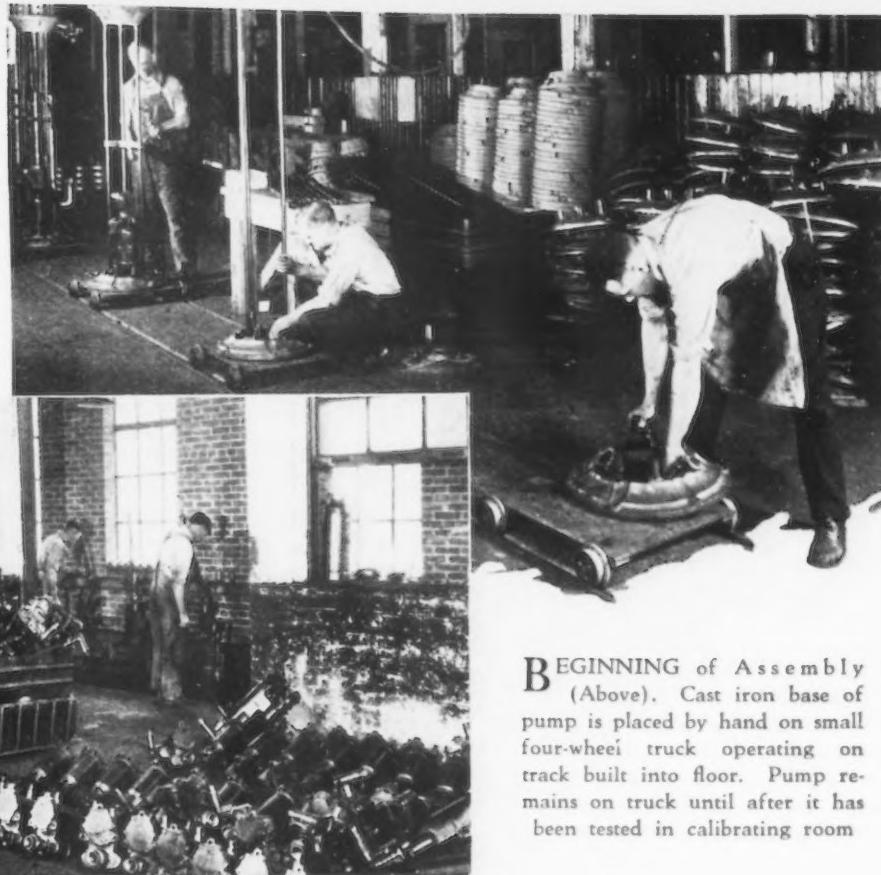
The pump is assembled part by part until, at station D, the glass measuring tank, forming the top of the unit, is attached. To simplify the assembly work as much as

the case of both visible and piston type pumps, permanent adjustments for measurements are made gallon by gallon as the gasoline is pumped from the underground tank, and are checked gallon by gallon as it is allowed to flow back.

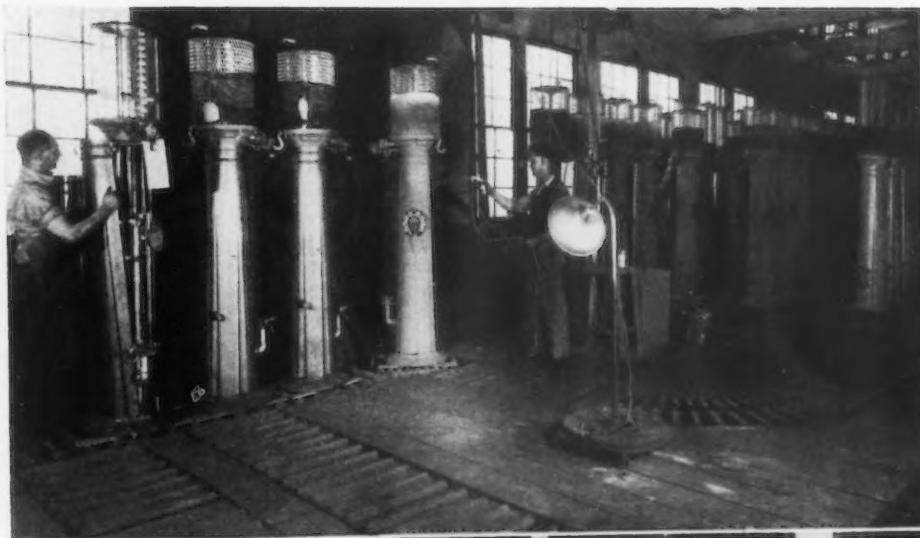
After the test in the calibrating room, pumps are moved on the track back to the turntable on the main assembly track, and again take their journey toward the east end of the building. At a distance of about 10 ft. from the turntable the track ends, and the pumps are moved on to a roller conveyor, the top of which is level with the floor. From this point until the pumps are packed for shipment to customers they do not leave the roller conveyor.

At station F the steel casing is added and the pump then travels to a paint booth, where the first coat of paint is sprayed on the inside and outside of the casing. As it passes through the spray booth, the roller conveyor is

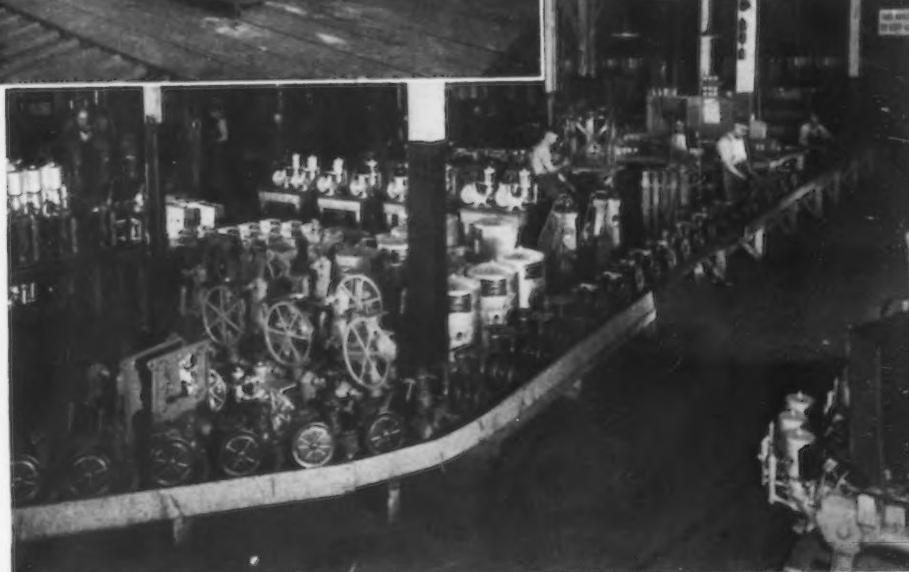
PUMPING Units for Gasoline Pumps Are Taken from Testing Stations to Assembly Line in Skid Boxes on Electric Trucks (Below)



BEGINNING of Assembly (Above). Cast iron base of pump is placed by hand on small four-wheel truck operating on track built into floor. Pump remains on truck until after it has been tested in calibrating room



COMING from Calibrating Room, Pumps Move on to Roller Conveyors (Above) for Remainder of Journey to Shipping Room. Here the casings are receiving coat of paint

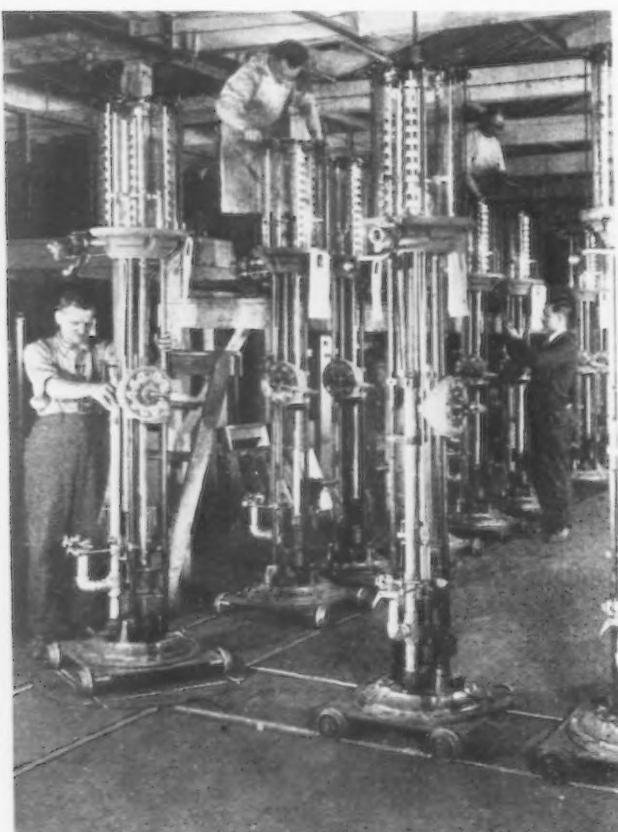


GRAVITY Roller Conveyor Forms Outer Edge of Two Sides of Water Pump Department, Being Used for Assembly Work and for Temporary Storage of Pumps (Below)

equipped with a turntable to facilitate the spraying operation. From the spray booth the pumps move to a temporary drying stand. When thoroughly dried, they rotate past the paint room until the second and third coats have been applied. Between painting operations they are switched to a temporary drying track.

After the second coat of paint has been applied, pumps go to the drying room, adjacent to the crating floor, where they are prepared for shipment. During their progress along the roller conveyor, the pumps rest on two pieces of wooden slats.

Water pumps are assembled in a separate department, which is served by a gravity roller conveyor. This conveyor forms the outer edge of two sides of the department.



WORKMAN on Platform Parelleling Assembly Line Places Glass Measuring Tank on Pump. Tanks are stored on balcony adjoining platform

It is useful not only for assembly work, but also for temporary storage of pumps.

Pumping units for the gasoline pumps are transported from the testing station to the assembly line by means of electric trucks and skid boxes. The company's experience over a considerable period of time has shown that this method of transportation is economical.

Method of Visual Control

Close control of operations is maintained by the production department. In the office of the production manager are a number of blackboard charts on which production activities are recorded. One chart, for instance, contains figures in regard to daily production and shipments, of each size and style of product manufactured by the company, during the current month. On another chart are summarized the production and the number of units still due on each model during the two-month periods of the current calendar year. Period A, for example, represents January and February.

The production manager is kept informed of activities

in the machine shop by means of a load chart. At the left of the chart is listed each machine in the shop and its number; at the extreme right is recorded the hours of machining time on each machine for 100 units of each model of pump. In the center of the chart is tabulated the number of machine production hours scheduled ahead. To have information upon which to regulate properly the use of machine tools, so that as many tools as possible will be in use the maximum amount of time, the production schedule for the current week is listed in the upper left corner of the chart.

Among the benefits resulting from operation of the mechanical conveying equipment and from close control of production are: 1.—Reduction in labor costs by elimination of considerable manual labor. 2.—Greatly increased output without adding to manufacturing floor area. 3.—Adaptability of an old building to the company's production requirements, rather than expenditure of additional capital for a new structure. 4.—Constant checking of production of various departments, thereby insuring maintenance of a high standard of efficiency.

Prevents Corrosion of Open Valley Flashings

A simple expedient for preventing corrosion of open valley flashings has been developed by the Bureau of Standards and Copper and Brass Research Association. In certain localities, particularly New York City and its environs, some trouble has been experienced on account of corrosion of copper flashings. The corrosion occurs on open valley flashings, usually on buildings with wood shingles, and results in a line of holes or cracks immediately under the overlying roofing.

Sixteen-ounce copper may, in some cases, be perforated in 15 to 20 yr. Failures of copper valley flashings are apparently of comparatively rare occurrence. However, copper is a material the use of which for roofing purposes is based on its well recognized resistance to destructive atmospheric agencies. Hence any factor which tends to limit its life, even to a slight degree, is of far greater importance than it would be for a cheaper material.

Studies of failures and the results of laboratory tests at the bureau, in cooperation with the Copper and Brass Research Association, showed that the corrosion is not primarily due to the action of the wood shingles. Under exceptional circumstances, failures may occur even when no material other than copper itself is present. However, any porous and absorbent roofing, such as wood shingles, will hold water between the roofing and the flashing for a longer time after a rainfall than slate or similar non-porous materials and therefore more rapid corrosion will result. It appears that flashings will be more likely to corrode in cities where the air is heavily contaminated with smoke or salt due to proximity to the ocean.

Laboratory tests indicate that the following simple and inexpensive precaution will eliminate troubles due to line corrosion. The method consists in placing a strip of smoothly finished, hard, dense wood, preferably water-proofed, between the flashing and the roofing. The strip should be about the dimensions of a lath. It should be placed about 1 in. back from the edge of the roofing, and nailed down tightly against the flashings. In the tests, specimens made in this way were unaffected by more than three times the test exposure which caused line corrosion failures of specimens with the roofing laid directly over the flashing. It is reasonable to suppose that a similar difference will be found under actual service conditions. Therefore, if the precaution is followed, no appreciable line corrosion of flashings will occur after 50 yr. or more of service under conditions as severe as in New York City.

New Torsional Spring Formulas

Correction to Standard Stress Formulas Essential with Small Coil Diameters—Conventional Methods May Be Far in Error

BY JOSEPH KAYE WOOD*

HELICALLY or spirally coiled springs, arranged to resist rotary motion or torques, are called *torsional* springs. The principal stress occurring in this type of spring is flexural and is universally considered to be uniform in character. The purpose of this article is to show that this stress, while flexural, is not uniform across the section of the wire; and furthermore to show that this non-uniformity calls for a correction of the standard or conventional formulas covering this type of spring.

This correction in the maximum stress formula amounts to a 30-per cent increase for helical springs having an index (ratio of mean coil diameter to wire diameter) equal to 3. A correction of this magnitude is of considerable practical importance, particularly in view of that ever arising condition in design of space limitation, which often forces the use of helical springs with low indexes. The correction of the maximum stress formula for spiral springs does not reach such magnitude, because the index of the minimum size coil is rarely less than 10.

Basis of Current Design Practice

The present standard formula for maximum stress is based upon the fact that the initial or free position of the wire is straight, as shown in Fig. 1. Under this assumption, if the wire is bent into a circular shape of mean radius r and the maximum stress is less than the elastic limit of the material, the stress gradient across any radial section of the wire is as shown in Fig. 2, in which $S_2 = S_1$ and the neutral plane is coincident with the geometrical center.

In practice the initial shape of a torsional spring is not straight, but circular, as shown in Fig. 3 (left), and the inside fiber δl_1 is shorter than the outside fiber δl_2 . In an initially straight wire (Fig. 3, right) the radius of curvature r is infinite and the lengths of fibers δl_1 and δl_2 are equal. Since these fibers are actually unequal in length, the corresponding fiber stresses occurring when the spring is deflected will likewise be unequal. Referring to Fig. 3 (left) the length of $\delta l_1 = \theta r_1$ and of $\delta l_2 = \theta r_2$. If we assume for the moment that the neutral plane does not shift from the geometrical center we have,

$$\frac{S_1}{S_2} = \frac{\theta r_2}{\theta r_1} = \frac{r_2}{r_1} \quad (1)$$

This gives rise to the stress gradient shown in Fig. 4. However, it would be impossible for a stress gradient of this type to exist, because the compressive stresses would obviously not balance the tensile stresses. Consequently, there must be a shift of the neutral plane toward the center of curvature, as shown in Fig. 5. Assuming that plane radial sections of the wire remain in plane after deflection, we have from Fig. 6, bearing in mind equation (1),

$$\frac{S_1}{S_2} = \frac{c_1 r_2}{c_2 r_1} \quad (2)$$

Setting $c = \text{index} = \frac{2 r_o}{d}$ where r_o is the mean radius of the coil and d the wire diameter, we have,

$$\frac{S_1}{S_2} = \frac{c_1 (c + 1)}{c_2 (c - 1)} \quad (3)$$

This shows that, as the index decreases (or curvature increases), the ratio S_1/S_2 tends to increase, while the simultaneous decrease of c_1/c_2 with increased curvature tends to decrease the ratio S_1/S_2 . It becomes necessary, therefore, to know the law governing the relation of c_1 to

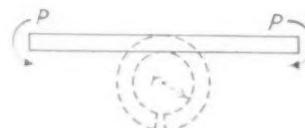


Fig. 1. Basis of Present Standard Spring Formulas.

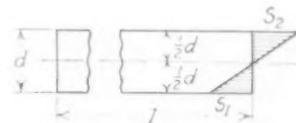


Fig. 2. Stress Gradient on Basis of Present Standard Spring Formulas

c_2 in terms of the index c . By definition and experiment, we have

$$E = \frac{S_1}{\epsilon_1} = \frac{S_2}{\epsilon_2} = \frac{S_x}{\epsilon_x} \quad (4)$$

Where the constant E is the modulus of elasticity, S_1 and ϵ_1 , the stress and unit deformation respectively of the inside fiber; S_2 and ϵ_2 the stress and unit deformation respectively of the outside fiber; and S_x and ϵ_x the stress and unit deformation respectively of any other fiber. From Fig. 6† we have,

$$\epsilon_1 = \frac{\phi c_1}{\theta r_1}; \quad \epsilon_2 = \frac{\phi c_2}{\theta r_2}; \quad \epsilon_x = \frac{\phi (x - r)}{\theta x} \quad (5)$$

In this, ϕc_1 , ϕc_2 , and $\phi (x - r)$ are the changes in length of the fibers whose initial lengths are θr_1 , θr_2 and θx respectively. Substituting these values in (4) we obtain,

$$E = S_1 \left(\frac{\theta r_1}{\phi c_1} \right) = S_2 \left(\frac{\theta r_2}{\phi c_2} \right) = S_x \left(\frac{\theta x}{\phi (x - r)} \right) \quad (6)$$

*In the various figures shown, the perspective view of the width of the wire has been omitted, since this is not necessary in the analysis.

*Consulting engineer, New York.

from which we have,

$$S_x = E \left(-\frac{\phi}{\theta} \right) \left(\frac{x-r}{x} \right) \quad (7)$$

Now, since the tensile stresses must balance the compressive stresses, we may write

$$\sum S_x \delta A = bE \frac{\phi}{\theta} \int_{x=r_1}^{x=r_2} \frac{x-r}{x} \delta x = 0 \quad (8)$$

and, since $bE \frac{\phi}{\theta}$ cannot equal zero, we have,

$$\int_{x=r_1}^{x=r_2} \frac{x-r}{x} \delta x = 0$$

which reduces to

$$r_2 - r_1 - r \log \left(\frac{r_2}{r_1} \right) = 0$$

Since, from Fig. 6, $r_2 - r_1 = d$ and c is the index $\left(\frac{2r_o}{d} \right)$, we have,

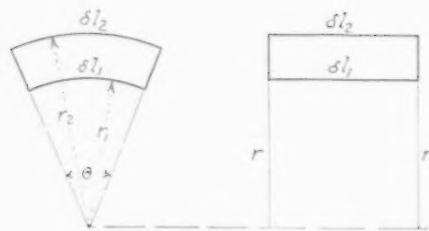


Fig. 3. Basis for Development of the New Formulas

$$r = d / \log \left(\frac{c+1}{c-1} \right) \quad (9)$$

From Fig. (6) we may note $r = r_1 + c_1 = r_o - \frac{1}{2}d + c_1 = (c-1)\frac{d}{2} + c_1$. Likewise, $r = r_2 - c_2 = r_o + \frac{1}{2}d - c_2 = (c+1)\frac{d}{2} - c_2$. Therefore, combining these two expressions separately with (9), we obtain,

$$c_1 = d / \log \left(\frac{c+1}{c-1} \right) - (c-1) \left(\frac{d}{2} \right) \quad (10)$$

$$c_2 = (c+1) \frac{d}{2} - d / \log \left(\frac{c+1}{c-1} \right) \quad (11)$$

Equations (10) and (11) give the relation of c_1 to c_2 in terms of the index c and the diameter of the wire d .

The distance γ which the neutral plane shifts from the geometrical center of the wire, due to initial curvature, is given by the following:

$$\gamma = \frac{d}{2} - c_1 = c_2 - \frac{d}{2} = \frac{cd}{2} - d / \log \left(\frac{c+1}{c-1} \right) \quad (12)$$

or,

$$\gamma = r_o - r = \frac{cd}{2} - d / \log \left(\frac{c+1}{c-1} \right) \quad (13)$$

Now, from the condition that the algebraic sum of all moments equals zero, we have

$$PD = \sum S(x-r) \delta A = bE \frac{\phi}{\theta} \int_{x=r_1}^{x=r_2} \frac{(x-r)^2}{x} \delta x$$

which reduces to

$$PD = A \gamma E \left(\frac{\phi}{\theta} \right)$$

or,

$$E \left(\frac{\phi}{\theta} \right) = \frac{PD}{A \gamma} \quad (14)$$

Substituting (14) in (6) we obtain the maximum stress,

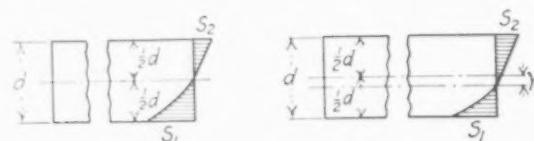


Fig. 4. Stress Gradient on False Assumption of No Shift of Neutral Axis

$$S_1 = \frac{PD}{A \gamma} \left(\frac{c_1}{r_1} \right) = \frac{PD}{A} \left(\frac{d/\gamma - 2}{d(c-1)} \right) \quad (15)$$

and since γ is given by (12) we have,

$$S_1 = 6 \frac{P}{A} \left(\frac{D}{d} \right) \left[\frac{2 - (c-1) \log \left(\frac{c+1}{c-1} \right)}{3c(c-1) \log \left(\frac{c+1}{c-1} \right) - 6(c-1)} \right] \quad (16)$$

Replacing the expression in the brackets by k_T , which we might call the stress correction factor for torsional springs, we obtain

$$S_1 = 6k_T \left(\frac{P}{A} \right) \left(\frac{D}{d} \right) \quad (17)$$

as the correct formula for calculating the maximum stress in torsional springs. In Fig. 7 the values of k_T for different values of the index c are plotted for convenience in calculating springs of this type. It should be noted that this correction factor increases with lower index, and amounts to almost 30 per cent for helical springs having an index of 3. (This shows more clearly on Fig. 9.)

Since the index varies for the spiral spring, it should be stated that this formula should be applied to the section of the spring having the lowest index.

Formula for Correction of Deflection

In Fig. 8 is shown a section of a coil before and after

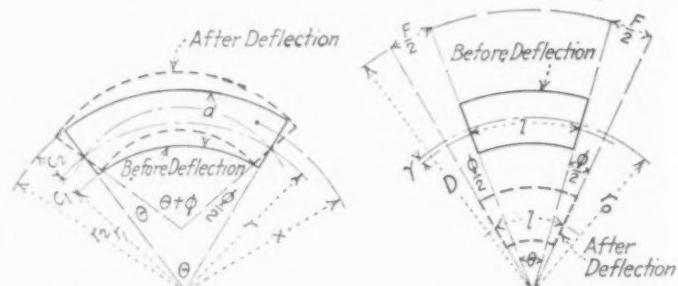


Fig. 6. Illustrating Derivation of New Formula for Stress

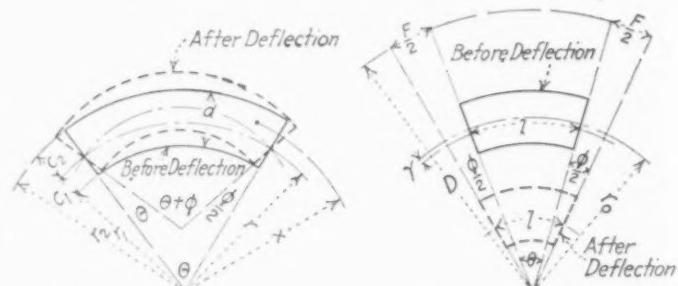


Fig. 8. Method of Derivation of New Formula for Deflection

deflection. The load P is applied tangentially to the load circle, the radius of which is D . Geometrically,

$$\frac{2\phi}{2} D = \phi D = \frac{2F}{2} = F$$

or,

$$\phi = \frac{F}{D} \quad (18)$$

Likewise,

$$\theta = \frac{l_0}{r_0} \quad (19)$$

Dividing (18) by (19) we obtain

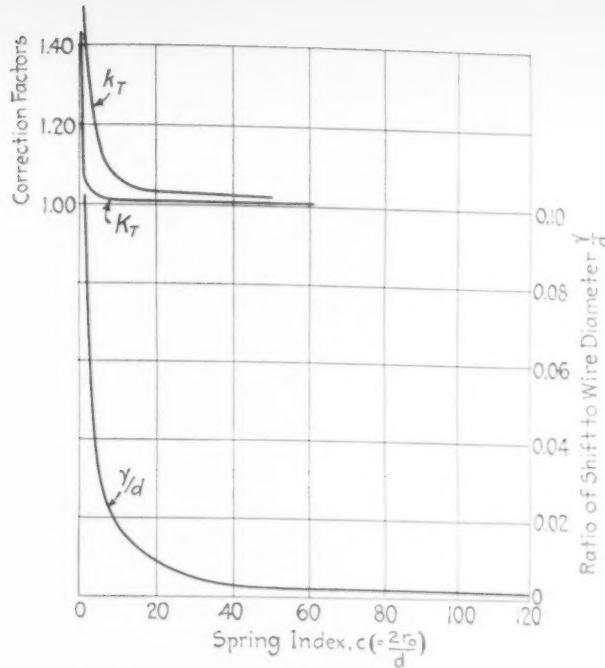


Fig. 7. Correction Curves for Both Stress and Deflection (Upper) and Curve Showing Shift of Neutral Axis (Lower)

$$\frac{\phi}{\theta} = \frac{F r_0}{D l_0} \quad (20)$$

Substituting this value of $\frac{\phi}{\theta}$ in (6) we get,

$$S_1 = E \left(\frac{F r_0}{D l_0} \right) \left(\frac{c_1}{r_1} \right)$$

and since the value of S_1 is given by (15) we have,

$$\frac{P D}{A \gamma} = E \left(\frac{F r_0}{D l_0} \right)$$

or

$$\frac{P}{F} = \frac{1}{12} E \left(\frac{A}{l_0} \right) \left(\frac{d^2}{D^2} \right) \left[\frac{12 \gamma r_0}{d^2} \right] \quad (21)$$

Replacing the expression in the brackets by K_T , which we might call the deflection multiplication factor for torsional springs, we obtain,

$$\frac{P}{F} = K_T \left(\frac{1}{12} \right) \left(\frac{E A}{l_0} \right) \left(\frac{d}{L} \right)^2 \quad (22)$$

as the correct formula for calculating the deflection of torsional springs helically coiled.

The correction factor K_T may be simplified further by a substitution of the value of γ as expressed by (12). Making this substitution and remembering that $2r_0/d = c$, we obtain,

$$K_T = 3c^2 - 6c/\log\left(\frac{c+1}{c-1}\right) \quad (23)$$

In Fig. 7 values of K_T have been plotted against corresponding values of the index c , with the result that the magnitude of this correction is shown to be almost inappreciable. In fact, the correction for the deflection of helically coiled torsional springs may be ignored entirely. On the other hand, the correction for maximum stress in this type of spring cannot be ignored, since the k_T curve in Fig. 9 shows that for index values less than 7 the correction k_T becomes quite large.

When applying the maximum stress formula in any design procedure we are concerned only with a single point, namely, any point where the stress is a maximum. The k_T curve shows that such a point may be found where the index c is a minimum. Since c is constant throughout the full wire length in a helical spring, the maximum stress formula may be applied to any point on the extreme

inner portion of a helical spring. The index c increases with wire length in a spiral spring, so that the maximum stress formula may be applied to only one point in this type of spring, namely, the extreme inner point.

Cumulative Effect Is Important

In the application of the deflection formula we are not concerned with a condition at a single point, but with the cumulative effect of conditions at all points. Since the index c is constant in the helical spring, formula (22) may be used for the accurate determination of the deflection of this type of spring. This formula is not strictly valid, however, for the spiral type of torsional spring, because, as stated previously, the index c varies in this type of spring. The value of K_T for the spiral spring may therefore be found by substituting some value of c less than the maximum and greater than the minimum values.

Since the minimum value of c for a given spiral spring is usually of the same order as the constant value of c in helical springs and the maximum value ranges between 30 and 80, it follows from a study of the K_T curve in Fig. 7 that the general magnitude of K_T for spiral springs is unappreciable and may be ignored, as in the determination of deflection for helical springs. The standard or conventional formula for the deflection of spiral springs is therefore recommended as the most correct formula to use in the design of this type of torsional spring. This formula may be expressed as follows:

$$\frac{P}{F} = \frac{1}{12} \left(\frac{E A}{l_0} \right) \left(\frac{d}{D} \right)^2 \quad (24)$$

In Fig. 7 the distance γ which the neutral plane shifts from the geometrical center, or, more strictly, from the center of gravity, is plotted against corresponding values of the index c . The resulting curve is an equilateral hyperbola whose asymptotes are the vertical and horizontal axes. Thus as the index ($= 2r_0/d$) approaches infinity, (assuming d to remain finite and constant) the original or undeflected form of the wire becomes straight and the shift approaches zero. For values of c greater than 20 the shift is extremely small; for example, where $d = 1/32$ in. the shift for an index of 20 is equal to only 0.00025 in.

This fact, and the fact that the difference in length between the inside and outside fibers for coils of large index is small in proportion to the coil radius, account for the small corrections required for springs of large indexes. Referring to equation (2), it may be noted that the unit stresses on the inside and outside fibers approach equality

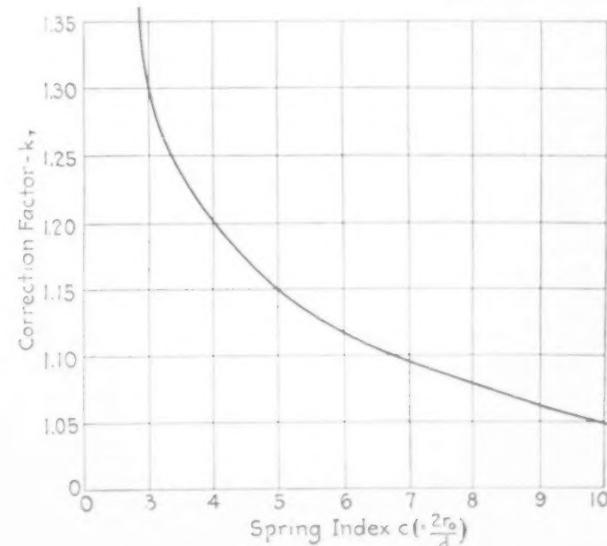


Fig. 9. Enlarged Detailed from Fig. 7, Showing Stress Correction Factor for Low Spring Indexes

as c approaches infinity. This may be better seen by substituting for c_1 and c_2 their respective values in terms of the shift as follows:

$$\frac{S_1}{S_2} = \left(\frac{(d - 2\gamma)}{(d + 2\gamma)} \right) \left(\frac{c + 1}{c - 1} \right) \quad (25)$$

The shapes of the k_T and K_T curves likewise conform to the hyperbola, due to the influence of the hyperbolical γ function.

Summary

As a result of the preceding analysis we have the following formulas by which helically and spirally wound torsional springs may be designed for all practical purposes:

Safe Maximum Stress

$$S = m k_T \frac{P_m}{A} \cdot \frac{D}{d} \quad (26)$$

Load-Deflection Rate

$$\frac{P}{F} = u K_T E \frac{A}{l_0} \left(\frac{d}{D} \right)^2 \quad (27)$$

In these formulas the symbols have the following meanings:

S = Safe maximum stress in lb. per sq. in.

m = Spring constant, equal to 1/8 for round wire and 1/6 for rectangular wire.

u = Spring constant, equal to 1/16 for round wire and 1/12 for rectangular wire.

k_T = Stress correction factor—a pure number; the value of this factor may be obtained from the curve in

Fig. 9 (or Fig. 7) or may be calculated by using the expression

$$k_T = \frac{2 - (c - 1)\log\left(\frac{c + 1}{c - 1}\right)}{3 c (c - 1)\log\left(\frac{c + 1}{c - 1}\right) - 6 (c - 1)} \quad (28)$$

In which the logarithms are Napierian

P_m = Safe maximum load in lb.

A = Cross-sectional area of wire in sq. in.

D = Moment arm of load in inches.

d = Diameter or thickness of wire in inches.

F = Deflection in inches.

E = Modulus of elasticity in lb. per sq. in.

l_0 = Length of spring wire in inches (for helical springs = $2\pi r_{on}$; for spiral springs =

$$2\pi \left(\frac{r_0 + r_s}{2} \right)_n$$

K_T = Deflection correction factor, which for all practical purposes may be assumed as being equal to unity.

c = Spring index = $2r_0/d$.

b = Width of wire in inches.

n = Number of coils in spring.

r_0 and r_s = Minimum and maximum coil radii respectively of spiral springs.

For high precision in design, the value of K_T should be taken from the K_T curve in Fig. 7. In the case of the spiral type of torsional spring the average value of K_T between the minimum and maximum limits of c should be used. However, in this type of design, care should be taken also to control other variations, which usually are quite wide in production springs, such as occur in the spring diameter or quality of material.

Theory and Practice of Corrosion Resistant Equipment

IN a lecture dealing exhaustively with the subject of corrosion of metals and their alloys, delivered recently before the Conservatoire des Arts et Métiers in Paris, France, Albert Portevin said that although at least 4000 investigations on corrosion had been made and published, the whole question is in a chaotic state.

If the choice of a non-corrosive substance were not restricted by price then platinum offered an ideal solution; if mechanical properties could be ignored then glass and ceramic products solved most of the other problems connected with corrosion. If, on the other hand, the lowest priced material must be used, then cast iron would serve, and if superior mechanical properties were essential, then ordinary steel conformed to most of the requirements.

However, modern machinery often imposes a peculiar combination of properties. Electrical necessities and pleasing color frequently cause the selection of copper and its alloys; for aircraft, where lightness is desirable, alloys of aluminum and magnesium merit close attention. The practical problem, therefore, is a complex one: How may the resistance of iron, steel, copper or aluminum to atmospheric and chemical conditions be increased, and how may economic and mechanical requirements be satisfied at the same time?

Heterogeneous structure in the metal encourages certain electrical actions which accelerate corrosion. On the other hand, the surface layer formed by the corrosion itself retards further action and may even completely arrest the chemical attack on the metal. All industrial metals (except perhaps the precious metals) are chemically unstable in the presence of oxygen and acids, and their only chance of survival is afforded by the protecting coat formed during early corrosion. The most interesting metals showing these phenomena are aluminum, nickel, co-

balt, and, in a less degree, copper and steel. Metals in themselves rapidly attacked may become passive (i.e., have a protective oxide formed) if certain additions (chromium, silver, molybdenum, vanadium and tungsten) are added to them.

Chromium steels, termed stainless, constitute an immense advance in the pursuit of corrosion resisting alloys. In M. Portevin's opinion their introduction marks a veritable revolution in the use of metals, not only for current industrial requirements, but also for the needs of important chemical processes.

These steels fall into three categories: (1) ferrites with very little carbon, and which are malleable and are employed without heat treatment; (2) martensites, non-malleable and used after hardening; and (3) austenites, solid solution alloys of iron, chromium, nickel and carbon, which after quenching are still malleable. These classes generally fall within separate scales of prices; each have a high resistance to nitric and phosphoric acids. Resistance to sulfuric and hydrochloric acids is increased by nickel. For applications permitting greater cost and maximum resistance to the latter acid nickel could be taken as the base, with additions of chromium, tungsten, molybdenum and aluminum, with or without iron.

In all practical applications heterogeneity must be avoided. This principle would require the minimum number of alloys in a particular system, at least where they come in contact, and where such a joint is exposed to the corrosive conditions. Extreme care must, therefore, be taken in fabrication, welding, riveting, or other methods of assembly which lead to inequalities of composition. Other important factors to be watched are the temperature and pressure of the corroding medium, its aeration, and the superficial condition of the metal used.

Scrap Industry Needs Consumers' Aid

Cooperation of Users of Old Material Necessary to Further Program of Improvement
Started by Scrap Institute, Says That Body's Leader

BY BENJAMIN SCHWARTZ*



IN the national welfare there is a definite relationship between the conservation of natural resources and the use of scrap iron and steel. In domestic commerce we have seen records of steel production established through the increasing use of scrap. In foreign commerce scrap has achieved the leading position in the grand total of exports of steel articles. From a by-product, scrap has become an important raw material.

From a collector of waste products, the scrap iron industry has become a conserver of genuine national wealth. These facts in their full import are just being realized by the Government, by the public and by the scrap trade itself.

Scrap iron and steel as a commodity, therefore, is too important to permit it to be surrounded with chaos and disorganization. Neither the dealer, because of the losses sustained over a period of years, nor the steel consumer, who ultimately must shoulder the cost of disorganization in the scrap industry, could long afford to remain indifferent to conditions.

A realization of the unfavorable factors surrounding the scrap iron industry brought about the organization of the Institute of Scrap Iron and Steel, Inc., about a year and a half ago. Compared with other trade associations and institutes which have been engaged in less difficult fields and industries, the Institute of Scrap Iron and Steel may be said to have enjoyed a modest degree of success. Through the frequent meetings of its 12 chapters and of the national organization, an industrial consciousness and a sense of cooperation have been instilled in the scrap trade. Through the institute's code of business practices, formulated with the cooperation of the Federal Trade Commission, and through its trade relations bureau, the highest principles of merchandising are being established. Through its various bureaus, covering the fields of traffic, arbitration, insurance, credit and research, many leaks in profits have been checked, by means of cooperative and educational measures.

Institute Trying to Do Its Part

The earnestness of the scrap trade of the country in trying to do its part in establishing higher standards, securing a freer flow of scrap to the various markets and insuring delivery of material in accordance with contracts and in compliance with specifications, has, in the writer's opinion, been amply demonstrated. That the members have become convinced of the effectiveness of the organization and that they approve of what the institute is trying to accomplish, is not alone attested by the fact that more than 400 representative dealers and brokers throughout the country are members, but is evidenced by the ease with which a fund of \$50,000 was recently raised to carry

on various research and bureau activities, through private contributions in addition to membership dues.

New Outlook for Scrap Industry

THE above is by way of introduction to demonstrate that a new outlook and background are being created in the scrap iron industry. Whereas other attempts at organization have failed during the last quarter of a century, the financial set-up of the present institute, the recognition it has received from the Government, the establishment of machinery for enforcement and education, and the leadership of one who is outside of the industry and beyond the differences and misunderstandings of the trade, are guarantees of success of the new program.

The activities which the scrap institute has undertaken represent a field of cooperation within the industry which the institute can pursue effectively by means of education, self-government and discipline. There is, however, a wider field outside of these activities, over which the institute has little control, and in which the cooperation of the scrap consumer is vital, if the program of the scrap industry is to be productive of the results that the consumers should welcome. The subjects in which the consideration and cooperation of the consumers are desirable may be listed under the heads of direct dealing, trade practices, specifications and conservation.

Direct Dealing Condemned as "Unfair"

Direct dealing refers to the practice of consumers in contracting for their scrap needs direct with producers. It is contended that the practice of consumers in buying the output of scrap from their customers, on the basis of trade paper quotations or otherwise, may constitute rebating on the price of finished steel and therefore contains an element of unfair competition. If this tendency continues many mills and other consumers of scrap may find themselves unable to compete in the sale of finished steel products when faced with strong reciprocal arrangements covering scrap. Many mills may find themselves embarrassed or may experience difficulty in securing necessary service from the scrap dealers if the ability of the dealers to serve is diminished or restricted. It is contended that these reciprocal arrangements are not only aimed at eliminating the scrap dealer, but become weapons of unfair competition among the steel mills themselves.

It would seem that, if the steel industry is desirous of preserving a fair price structure, toward which it has been striving for many years, the foundation of this price structure may be affected if these reciprocal arrangements are encouraged. It would appear that, when the steel industry is operating at about 65 per cent of capacity, the necessity of mills to keep their operations going would be greatly facilitated by rebating in prices, which is possible of achievement through reciprocal scrap arrangements. The use of scrap as a lever for the sale of finished steel products should be found objectionable to those who have to determine policies for the steel industry.

In competing with scrap iron dealers for their supplies

*Director General, Institute of Scrap Iron and Steel, Inc.

at the same sources, certain scrap consumers are extending more favorable terms to the producer in price, credit, inspection and specifications than they extend to the scrap iron dealer for similar classifications of scrap. This may involve paying a higher price to the producer, guaranteeing that there will be no rejections or suspensions or reduction in price, or paying on the basis of railroad weights at point of shipment. Shipments of scrap from dealers are generally subject to the fact that they must be "suitable and acceptable" to the consumer, which may allow for varied interpretations of specifications in accordance with market conditions or conditions at the respective mills. Mill weights usually govern when the dealer ships, and the mill retains the right to suspend a dealer's shipments to his exclusive loss. It ought to be evident that these buying methods involve not only unfair competition with the scrap iron dealer, but also elements of discrimination with which the scrap iron industry cannot compete.

The practice is developing among steel mills of buying mixed or unprepared scrap from various sources, including the smallest junk yards, by paying prices which would not warrant the preparation of this scrap by the dealer for the open market. This procedure, in our opinion, is aimed at the sources of scrap of other competing consumers, who heretofore have been buyers in the open market of the same scrap in a prepared condition. By taking away the unprepared scrap at its very source these consumers are threatening the sources of supply of other mills.

A Matter of Concern to Steel Industry

WE maintain that direct dealing and the practices growing out of it are matters of as great concern to the steel industry as to the scrap iron industry. Questions of policy, and not merely purchasing methods, are involved, and these should be considered by the responsible leaders of the steel industry. We contend that the effects of direct dealing, as practised today, are:

First: To bring about an invasion of scrap markets that have been the sources of supply of local steel mills and to disrupt normal scrap markets.

Second: To introduce the elements of discrimination and unfair competition among the steel mills, as well as among the scrap iron dealers.

Third: To affect price structure of the steel industry.

Fourth: To jeopardize the investment of the scrap iron industry, and prevent it from rendering its recognized service to American industry and to the national welfare.

Fifth: To destroy initiative, which more than the price of scrap, is yielding a great volume of scrap iron and steel. Reciprocal agreements will not keep together the vast national organization, employing more than 150,000 men, for whom, we maintain, no substitute can be provided to bring out the many millions of tons of scrap iron and steel which are distributed throughout the country. Nor will reciprocal agreements be the magic wand that will bring to life a vital organization, once it is reduced in effectiveness and men have been dismissed into other fields, at a time of national emergency when speed in scrap gathering may be assumed to be very important. If the commodity of scrap is recognized as important, and if the scrap iron dealer renders a useful service, it ought to be evident that the scrap industry cannot be stifled and revived at will.

The result, in our opinion, may well be to allow certain consumers, who are developing these reciprocal arrangements and methods, to occupy independent positions, so far as their scrap requirements are concerned, and to prevent the scrap iron industry from fulfilling its contracts with the hundreds of other consumers, who rely for their sources of scrap on the scrap iron industry.

On May 23, 1929, a national conference of the scrap

iron industry was held in Pittsburgh, under the auspices of the Federal Trade Commission. At this conference a code of business practices, setting high standards for the industry, was adopted and finally approved by the Federal Trade Commission. This code involves the definite recognition by the Federal Trade Commission of the scrap iron industry and the institute, as its spokesman, and contains resolutions condemning such practices as doctoring of cars, failure to fill orders, interference with contracts, commercial bribery, defamation of competitors, etc.

In the enforcement of this code, the cooperation of consumers is not only welcomed, but essential. It is our conviction that these resolutions are for the benefit of consumers, as well as scrap iron dealers, and that ultimately the cost of disorganization and cut-throat competition within the scrap iron industry is generally paid by the consumer. Cooperation of consumers with the institute in maintaining the standards set by the code would prove beneficial to the consumers in assuring a steady flow of their scrap requirements in accordance with specifications and contract terms, and in accordance with the law of supply and demand.

Uniformity in Specifications Lacking

IN the past, consuming interests have developed various forms of penalizing the shipper of scrap iron and steel, embodied in certain charges, interpretations of specifications, reductions in prices, chargeable to entire carloads of material, blacklisting, etc. The Institute of Scrap Iron and Steel is developing its program out of the hopes of the future and not out of the heritage of the past, and, in view of the new spirit of cooperation and self-government established in the scrap iron industry, reliance upon these forms and penalties is unwarranted. It is our contention that the time has come for consumers to shift part of the burden from themselves to the scrap iron industry, which is prepared to adjust complaints and misunderstandings through a competent organization and machinery, and that in the best interests of all parties, self-government is preferable and more in consonance with American principles than external pressure or discipline. A machinery of cooperation with consumers to bring to full effectiveness the work already undertaken by the Institute of Scrap Iron and Steel is highly desirable.

Although the dealer is presumed to know what each consumer desires, this presumption is materially weakened when one considers that there is no uniformity in specifications or in the interpretation of these specifications. It is stated that many specifications, formulated years ago, have not been changed to meet the conditions of American industry, which is producing scrap not contemplated by the original specifications. It is not suggested that uniform specifications for all consumers be established, or that the scrap iron industry should trespass on the right of the consumer to be the final judge as to what material it requires, or will accept, but it is stated that market conditions should not be a principal factor in determining what is or is not a good delivery on a contract and that consumers should create clear specifications for all classes of scrap which they can use and have been using. It is believed that judicious changes will create new markets for scrap, secure a freer movement of desirable material and reduce the losses to dealer and consumer because of rejections.

The scrap problem is complicated by the increasing use of alloys. This is a subject which concerns not only the dealer in the preparation of his scrap, but also the consumers in the proper use of the same. Foresight would dictate that research be applied to this problem. The research laboratories and facilities being available in the steel industry, the Institute of Scrap Iron and Steel is anxious to cooperate to the best of its ability in arriving at a solution of this problem.

Talbot Process in Steel Furnace

200-Ton Open-Hearth Unit in German Plant Makes Heats in 4 Hours—Details of Design and Operation

BY W. ALBERTS*

FINDING the available quantity of raw steel insufficient for its new blooming mill, which can produce 80,000 to 85,000 tons a month, the Vereinigte Stahlwerke, Huette Ruhrort-Meiderich, decided to increase the open-hearth capacity to meet demands. Between 1914 and 1922 F. Schuster and J. Puppe made a thorough comparative study of the Talbot furnace, looking to use not only the pig iron-ore method, but the pig iron-scrap method as well, or to utilize variations of either.

Although such a furnace is decidedly more expensive to build than other open-hearth furnaces, it assures the possibility of adapting the steel-making process entirely to the scrap or pig iron market. As built, the furnace operates on artificial draft. The blower has a capacity of 2,000,000 cu. ft. of waste gases, based on 32 deg. Fahr. and 30 in. of mercury.

Gas and Air Valves

In selecting the valves, the question of available space was the deciding factor. If there had been sufficient room it would not have been difficult to come to a definite decision. It was necessary to choose a kind of valve which would not interfere with slag removal. What are believed to be the most satisfactory valves are Blaw-Knox reversing dampers, which were placed with difficulty between the columns facing the scrap yard and which are 11 ft. 3 $\frac{3}{4}$ in. wide.

*Duisburg-Ruhrort, Germany. This is abstract of an article translated from *Stahl und Eisen* of July 4, 1929, by F. Brandt, Sheffield Steel Corporation, Kansas City, Mo.

The reversing mechanism, about which nothing definite has been made known in German literature, has four gas and air dampers. They are built directly into the reversing channels of the gas and air chambers, which have sections of 47 $\frac{1}{4}$ x 71 in. and 59 x 71 in. respectively. The strongly built side frames of each damper set are made of hematite and cast hollow. They are cooled by means of cast-in pipes.

Motor-Operated Dampers

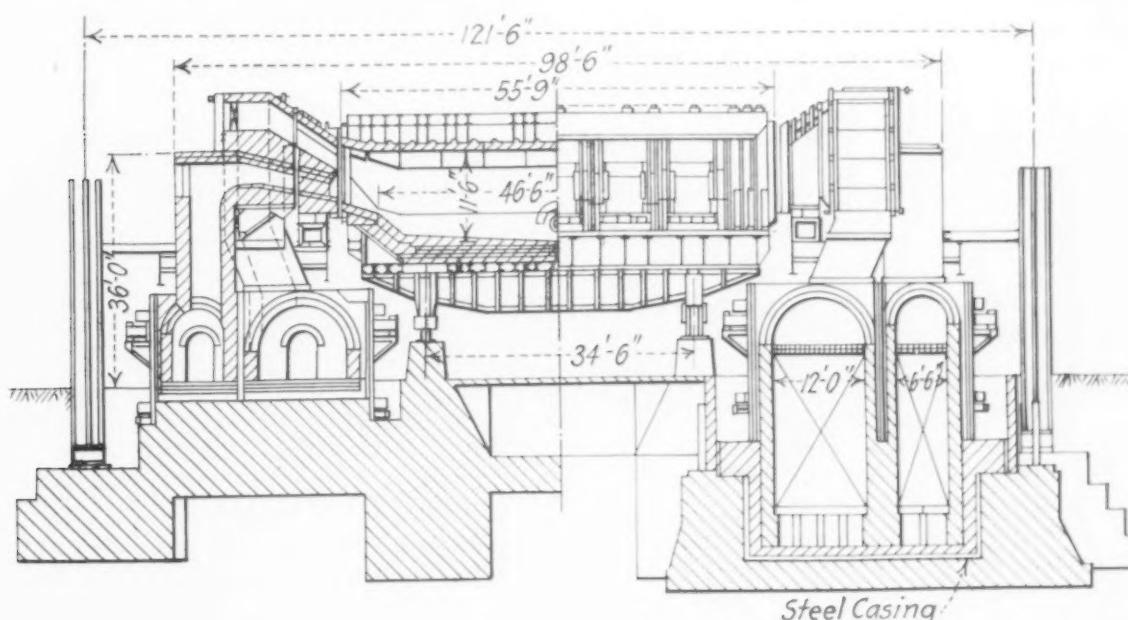
All four damper drives are alike, except for the length of the rack and the damper rod, and they are equipped with the same type 5-kw., 1400-r.p.m. motors. These motors are amply strong and reverse the dampers to their extreme lift in about 8 sec.

The two gas and air dampers are not coupled, either electrically or mechanically. Each set is adjusted by two regulating drums which have a common drive. The position and motion of the dampers are shown by an indicator located at the control station on the charging floor.

During holidays all dampers may be closed and the furnace shut off tightly to keep it warm. This is not possible with any other make of valve; nor has it been accomplished with some of the dampers of standard design.

Average consumption of cooling water for the dampers and damper frames is 4000 gal. an hour. Part of the cooling water is used as feed water for the waste-heat boiler, and the remainder is returned to the cooling tower.

Consumption of cooling water for the furnace is about



Longitudinal Section Through the Furnace, Showing the Tilting Member to Be 55 Ft. 9 In. Long. The unusual depth of regenerator chambers (lower right) will be noted

26.40 gal. per ton of steel, or a total consumption of about 37,000 to 40,000 gal. an hour. The water is raised by medium-pressure pumps into a tower 145 ft. high, with a capacity of 132,000 gal.

Furnace Tilted by Pivoted Racks

The furnace was built as a tilting open-hearth furnace of 200 tons capacity. It rests upon a structural frame which is equipped with two roll segments. The buckstays are tied in both directions, and the roof is held down by flat steel bands.

The tilting mechanism consists of two racks which are pivoted to the furnace. Movement is imparted to the racks by motor-driven worm and spur gear transmission. Along the arc of the tilting segment, which has a radius of 16 ft. 8 $\frac{3}{4}$ in., the furnace can be tilted to an angle of 26 deg. toward the steel tapping side and 12 deg. toward the slag tapping side.

On account of ground water danger, the reinforced concrete walls of the chamber pits are lined with $\frac{3}{8}$ -in. steel sheets welded water-tight. The sheets run up on the side wall to height of 11 ft. 6 in.

Furnace Nearly 100 Ft. Long

Length of furnace, measured from out to out of gas shafts, is 98 ft. 5 $\frac{1}{2}$ in.; length of hearth between heads, 55 ft. 9 5/16 in.; width of hearth, 14 ft. 5 $\frac{1}{2}$ in. The hearth is made of four flat courses and two roll courses of magnesite brick, covered by tamped dolomite mixed with tar to a thickness of 10 $\frac{1}{4}$ in., making a total thickness of hearth bottom of 30 in. The mean depth of bath is 35 $\frac{1}{2}$ in.

Rear and front walls are both sloping. The rear wall is made entirely of magnesite brick, with thickness 39 $\frac{3}{8}$ in. at bottom and 31 $\frac{1}{2}$ in. at top. The front wall between doors is 38 $\frac{3}{8}$ in. thick at the bottom and 31 $\frac{1}{2}$ in. at the top. Above the slag line, the front wall is made of first quality silica brick. The furnace roof has a span of 21 ft. 4 in., measured from center rear wall to center front wall. Total roof area is 1151.75 sq. ft., and the maximum free height inside of furnace, measured at center, is 11 ft. 5 $\frac{3}{4}$ in.

There are five doors, each 4 ft. 1 $\frac{1}{4}$ in. square and spaced 8 ft. 7 $\frac{3}{8}$ in. center to center. The door frames and doors are made of bronze and are water-cooled. The doors are lined on the inside with firebrick and are lifted by compressed air. Water consumption of doors and door frames is 15,850 gal. an hour.

Furnace Ends and Ports

The furnace heads [ends] are stationary and are equipped with interchangeable front pieces [ports], system Friedrich. They are 21 ft. 4 in. long and 26 ft. 3 in. high, measured from top of chamber roof to top of air shaft roof. The ends of the heads facing the center furnace are finished with large cooled frames.

A head dismantled after the first furnace run showed the brickwork so well protected by the water-cooling system that the flow of gas was uniform from the first heat to the last. Over the gas shaft, where the cooling had lost its effect, the hot waste gases, mixed with lime and ore particles, had eaten holes in the silica brick.

Regenerators Are in Deep Chambers

As a furnace works to best advantage when the indispensable basic conditions of a strong draft are complied with, a height of 31 ft. 2 in. was chosen for the chambers, making the total height of the furnace approximately 57 ft. 5 in., measured from bottom of chamber to air-shaft roof.

The four chambers are clad with $\frac{3}{8}$ -in. steel plates

from the top of the walls to a depth of 19 ft. 8 $\frac{1}{4}$ in. This is not to strengthen the chamber structure, but to prevent infiltration of air or gas leakage through the joints of the brickwork. It may be said, however, that the steel casings answer their purpose only partly, since the gas passes through the joints and cracks in the walls, then rises between walls and casings, and escapes where the sheets terminate. This leakage is especially noticeable when mixed gas is burned.

Checkerwork in the air chambers is 19 ft. 8 $\frac{1}{4}$ in. long, while the length of the adjoining slag pockets is 41 ft. 2 in. The bottom of the slag pockets is held level with the mill floor. The width of each air chamber is 11 ft. 9 $\frac{3}{8}$ in., while that of the gas chambers is 6 ft. 6 $\frac{3}{4}$ in. With the exception of this difference, the air and gas chambers are of the same dimensions. The rider walls are 3 ft. 11 $\frac{1}{4}$ in. high, extending the rider tile and the checkerwork to a height of about 19 ft. 8 $\frac{1}{4}$ in. The contents of the checkerwork are consequently 4575 cu. ft. for the air chambers and 2542 cu. ft. for the gas chambers.

Bricks of standard size were used for the checkerwork. The lower courses (two-thirds of the checkerwork) are of first quality fire clay; the upper courses (one third of the checkerwork) of silica brick. The slag pockets are dimensioned so they will hold about 3530 cu. ft. of slag. The sectional area of the air flues is 5 ft. 10 $\frac{7}{8}$ in. x 4 ft. 11 in.; that of the gas flues, 5 ft. 10 $\frac{7}{8}$ in. x 3 ft. 11 $\frac{1}{4}$ in.

Mixed Gas Used as Fuel

Coke-oven gas is pumped from a neighborhood coke plant into the gas-mixing station. This station has also a suction pump which furnishes from the blast furnace line as much gas as the steel plant needs for a proper mixture.

This mixed gas has a heat value of about 225 B.t.u. to the cubic foot and flows to the open-hearth plant with a pressure of from 3.15 to 3.94 in. water. The main mixed gas line has a diameter of 47 $\frac{1}{4}$ in. and from this a branch line of 39 $\frac{3}{8}$ in. leads to the two gas valves of the tilting furnace.

Much Pig Iron in the Charge

Charges in the furnace consist mostly of 70 to 72 per cent pig iron and 25 to 29 per cent scrap, while 17 to 18 per cent ore and 12 to 13 per cent lime was used. In these charges the slag ran from 24 to 26 per cent. Hourly production of the furnace has fluctuated from 12 to 16.5 tons, depending on many influences acting adversely or favorably.

F. Schuster has called attention to the fact that, when a change of phosphorus content in pig iron is increased from 1 per cent to 1.8 per cent, the quantity of scrap charge remaining the same, the melting time is lengthened by about 8 per cent. The condition and composition of the ore likewise influence the melting time.

[In the original article several tables show operating conditions, amount of charge and both metal and slag analyses. Figures were given for about a dozen heats. Steel retained in the furnace after previous tapping varied from 125 to 142 tons. The charge added included about 46 tons of iron from the mixer and about 21 tons of scrap, with certain variations in these figures. The resulting bath ranged from 186 to 211 tons. Heats tapped were all the way from 56 to 77 tons, and the steels made varied from 0.06 to 0.58 per cent carbon.

Melting time from tap to tap was exceptionally good, several of the heats showing no more than 4 hr. 10 min., the lowest being 4 hr. and the longest, which was a low-carbon heat, 5 hr. 35 min.]

The bath showed about 0.90 per cent carbon after pig iron and scrap had been charged. In 1 $\frac{1}{2}$ hr. the carbon

was reduced to 0.14 per cent, due to the strong reactive effect of the ore and of the oxidizing flame.

Heavy Production Attained

Under uniform conditions it is not difficult for the furnace to produce 15 to 16 tons an hour. In planning the furnace, coke-oven gas of 425 B.t.u. to the cubic foot, with a pressure of 3.15 in. water, was taken as the basis. The gas supplied occasionally drops as low as 370 B.t.u., which has materially affected the performance of the furnace. This is to be corrected by obtaining the gas supply from an industrial main line.

Output of this furnace on the basis of weekly averages is reported for the first eight weeks as respectively 261, 324, 300, 286, 299, 366, 375 and 358 tons for each working day. The average for the first five weeks was 294 tons; for the three succeeding weeks 366 tons. Without allowing for the partial shutdown over Sunday, the average for the first five weeks was 278 tons and for the three next weeks 335 tons for each furnace day.

endothalmic reactions taking place at the moment the raw iron is being charged.

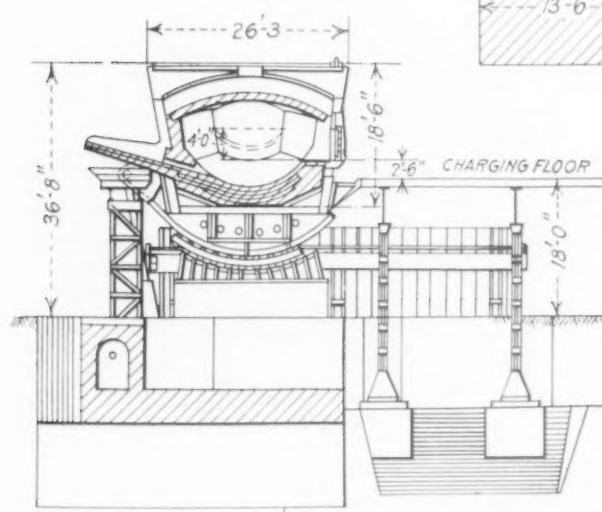
If the additions and the iron are charged at too short intervals, or in a haphazard fashion, the heat loss is so great that the process can be carried through only by prolonging the melting time considerably. Correct charging gives the advantage of working with high flame temperatures and oxidizing flame. The bath, at that time, has a great capacity for absorbing heat and there is no danger in overheating the furnace.

Conditions being favorable, the operators have succeeded in getting a 65-ton heat in 3 hr. 50 min. melting time. Such melting periods will not be exceptions. The duration of most melts will be between 4 and 4½ hr., as illustrated by figures of the last three operating weeks, which show 5.6 melts in 24 hr., or an average of 4 hr. 20 min. each.

B.T.U. Consumption Under 4,000,000

The heat consumption for three months of operation

Transverse Section Through Center-line of Furnace, Showing Method of Tilting Through Action of a Telescoping Cylinder, the Hearth Moving on Rollers (Below)

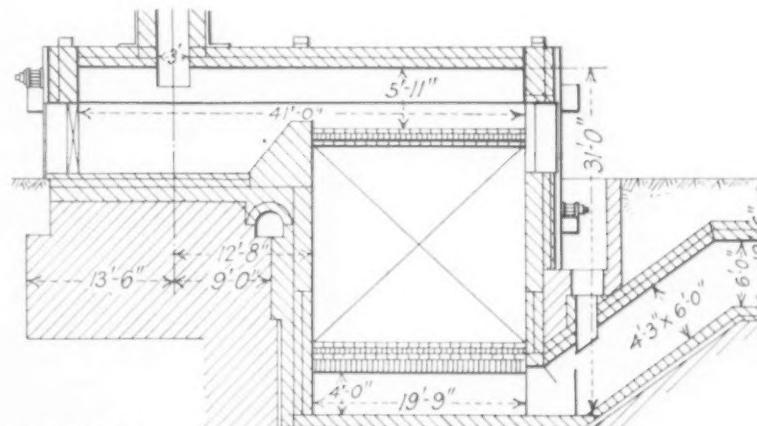


Even though new crews had to be made acquainted with the operation of a tilting Talbot furnace, the performance, during the first five weeks, proved decidedly higher than was obtained at the Witkowitz plant up to 1920. The efficiency increased considerably from the sixth to eighth week. The production figures of 294 tons and 366 tons correspond to a furnace performance of 12.25 tons and 15.25 tons an hour.

It should be stated that today higher productions than formerly are made at the Witkowitz plant, the yearly average having been 339.2 tons in 1927 and 333.2 tons in 1928.

Method of Operation

Adding of the raw iron in the open-hearth furnace at the right time was found of decided importance for steady progress of the heat. It should be added when the previously charged scrap, ore and lime have been brought to correspondingly high temperatures, because a great amount of heat is being drawn from the bath, due to the



Section Lengthwise Through Regenerator Chamber, Showing Steel Casing to Prevent Infiltration of Air (Above)

averaged 5,156,000 B.t.u. per ton of steel. Deducting the heat regained in generating steam, which amounted to 1,260,000 B.t.u., gives a net consumption of 3,896,000 B.t.u. per ton of steel, equivalent to about 310 lb. of coal. The manifold fluctuations in the delivery of gas have been considered in these figures. Under normal conditions, more favorable heat consumption can be expected.

The following values, which were established with above data as a basis, can be regarded as fairly correct. Each ton of steel produced required:

Silica brick	17.9 lb.
Magnesite brick.....	4.4 lb.
Burned dolomite.....	26.5 lb.
Burned magnesite	1.5 lb.
Mortar	11.0 lb.

While these figures move within limits common in average practice, the use of dolomite is still rather high. This is because the melters, being used to operating stationary furnaces, used more dolomite than was actually necessary. Unless the Talbot furnace is completely drained for needed repairs, all of the hearth does not come in contact with the slag and is, therefore, of longer endurance. During operation, only the slag zone and the backwall need to be repaired, consequently less dolomite per ton of steel should be required in a Talbot than in a stationary furnace.

As the ladles are not exposed to the attack of the slag, their durability is much greater than those used for stationary furnaces. For stationary furnaces, the ladle lining will last 18 heats, while for Talbot furnaces the same lining needs renewing only after 25 heats.

Mining Engineers Announce Programs

Three Sessions by Steel and Five by Non-Ferrous Divisions
—Howe Lecture by Dr. Jeffries

TECHNICAL programs and general arrangements for the one hundred and thirty-ninth meeting of the American Institute of Mining and Metallurgical Engineers in New York, Feb. 17 to 20, are announced.

The iron and steel division opens its program on Wednesday afternoon, Feb. 19, with a session on ore and foundry practice. Five papers are scheduled. On Thursday morning, Feb. 20, a general session will embrace papers on steel with one in the afternoon on alloy and steel melting. The Howe Memorial Lecture, by Dr. Zay Jeffries, follows this at 4 p. m. His subject is, "The Future of the American Iron and Steel Industry." The papers listed for the iron and steel division follow:

"Sintering Limonitic Iron Ores at Ironton, Minn." by Perry G. Harrison.

"Experiment Demonstrates Method of Producing Artificial Manganese Ore," by T. L. Joseph, E. P. Barrett and C. E. Wood.

"Electrolytic Iron from Sulphide Ore," by Robert D. Pike, George H. West, L. V. Steck and Ross Cummings.

"Production of Gray Iron from Steel Scrap in the Electric Furnace," by T. F. Baily.

"Reclaiming Steel Foundry Sands," by A. H. Dierker.

"The Influence of the Rate of Cooling on the Dendritic Structure and Microstructure of Some Hypoeutectoid Steel," by Albert Sauveur and C. H. Chou.

"Tensile Properties of Rail and Other Steels at Elevated Temperatures," by John R. Freeman, Jr., and G. Willard Quick.

"Endurance Properties of Steel in Steam," by T. S. Fuller.

"Large Iron Crystals: Their Production and Some of Their Properties," by N. Ziegler.

"Influence of Nitrogen on Special Steels and Some Experiments on Case Hardening with Nitrogen," by Shunichi Satoh.

"Progress Notes on the Iron-Silicon Equilibrium Diagram," by Bradley Stoughton and Earle S. Greiner.

"Rate of Carbon Elimination and Degree of Oxidation of the Metal Bath in Basic Open-Hearth Practice, II," by Alexander L. Feild.

"A New Method for Determining Iron Oxide in Liquid Steel," by C. H. Herty, Jr., J. M. Gaines, Jr., H. Freeman and M. W. Lightner.

Institute of Metals Papers

An extensive program has been arranged for the institute of metals division, starting Tuesday afternoon, Feb. 18, with a session on corrosion and general subjects. Two complete sessions on Wednesday will be devoted to copper and brass followed by the annual lecture which will be delivered by Dr. Samuel L. Hoyt, General Electric Co., whose subject is, "Hard Metal Carbides and Cemented Tungsten Carbide." A symposium is scheduled for Thursday, Feb. 20,

with eight papers on melting and casting metals. That evening the regular dinner will be held at the Savoy-Plaza Hotel and G. H. Clamer, Ajax Metal Co., will discuss "The Induction Furnace for the Melting of Metals." The technical papers arranged for the various sessions are as follows:

"The Influence of Cyclic Stress on Corrosion," by D. J. McAdam, Jr.

"Stress-Corrosion Cracking of Annealed Brass," by Alan Morris.

"Internal Stress and Season Cracking in Brass Tubes," by D. K. Crampston.

"Corrosion of Alloys Subject to the Action of Locomotive Smoke," by F. L. Wolf.

"X-ray Notes on the Molybdenum and Iron-Tungsten Systems," by E. P. Chartkoff and W. P. Sykes.

"Expansion Properties of Low-Expansion Fe-Ni-Co Alloys," by Howard Scott.

"Studies in Metal Crystal Orientation—I. Determination of Orientation of Metallic Single-Crystal Specimens by High-Voltage X-rays," by Thomas A. Wilson.

"Etching of Brass," by Walter Graham.

"The Alpha-Phase Boundary of the Ternary System Copper-Silicon-Manganese," by Cyril S. Smith.

"Thermal Conductivity of Copper Alloys—I. Copper Zinc Alloys," by Cyril S. Smith.

"The Alpha-Beta Transformation in Brass," by Albert J. Phillips.

"Certain Types of Difficulties Occurring in Copper Wire as the Result of Improper Dies and Drawing Practices," by H. C. Jennison.

"Directed Stress in Copper Crystals," by C. H. Mathewson and K. Van Horn.

"Notes on the Distribution of Lead Impurity in a Copper Refining Furnace Bath," by J. Walter Scott and L. H. DeWald.

"A Theory Concerning Gases in Refined Copper," by A. E. Wells and R. C. Dalzell.

"Comparison of Copper Bars Cast Vertically and Horizontally," by J. Walter Scott and L. H. DeWald.

"Recent Development in the Melting and Annealing of Non-ferrous Metals," by Robert M. Keeney.

"Some Notes on the Melting and Casting of Gold and Silver Alloys," by Edward A. Capillon.

"Monel Metal and Nickel Foundry Practice," by E. S. Wheeler.

"Effect of Oxidation on Certain Impurities in Bronze," by J. W. Bolton and S. A. Weigand.

"The Influence of Silicon in Foundry Red Brasses," by H. M. St. John, G. K. Eggleston and T. Rynalski.

"Melting Bearing Bronze in Open-Flame Furnaces," by Ernest R. Darby.

"Oxides in Brass," by O. W. Ellis.

Banquet at Commodore

The annual banquet, which for many years was held at the Waldorf-Astoria, is scheduled for Wednesday evening at the Hotel Commodore. At this dinner the James Douglas Medal will be presented to John Van Noststrand Dorr and the Robert W. Hunt Medal to James Aston. William S. Unger will be the recipient of the J. E. Johnson, Jr., Award for 1930. The Class of 1880 Legion of Honor men will be welcomed.

Asks for Lower Tin Plate Price

The price of tin plate remains a burning issue with all users of packers cans, according to the *Optimist*, a publication of the Campbell Soup Co. What it says substantially in full, is as follows:

In November the American Sheet & Tin Plate Co. announced there would be no change in the official price for tin plate for delivery during the first six months of 1930 and that it would remain at \$5.35 per base box, f.o.b. Pittsburgh district.

This announcement was rather startling, particularly in view of the fact that the price of pig tin (Straits), one of the essential factors in determining tin plate price, had shown a decline during the preceding year of approximately 10c. a pound. In addition, tin mill black sheets were not in as strong a position as they were in November, 1928, when they were in heavy demand for automobile manufacture.

In view of their attitude in November, the trade was greatly surprised by the announcement made by the American Sheet & Tin Plate Co. late on Dec. 31, that the official price for tin plate for the first six months of

1930 would be \$5.25 per base box. This reduction of 10c. per base box was accompanied by a statement that it was made to prevent price cutting, which was admittedly prevalent in certain sections of the country.

If price cutting was prevalent, it was perfectly evident that the official price was too high, and while the reduction of 10c. per base box was welcomed by canners throughout the country, they did not feel then, and do not believe now, that it was adequate.

To prove their contention, the statistics here tabulated may be offered. We believe that during the past seven years the Steel Corporation effected economies in operation and improvements in mill practice fully commensurate with the progress made by similar organizations in other lines of industry. Based on the subjoined comparisons, it seems fairly obvious that a price for tin plate of somewhat less than \$5 a base box is indicated and justified.

	January, 1923	January, 1930
Straits tin, per lb.	\$0.3917	\$0.39
Sheet bars, per gross ton...	37.50	34.00
Black sheets, per 100 lb...	3.35	2.90 to \$3.00
Steam coal, per net ton....	3.40	1.60 to 1.70
Tin plate, per base box....	4.75	5.25

No Sustained Recovery in Steel Production Is Yet Forecast

BY LEWIS H. HANEY

Director, New York University of Business Research

FAVORABLE FACTORS

- 1.—Retail trade was well sustained through December
- 2.—Unfilled orders increased
- 3.—Steel scrap markets have been firm
- 4.—Position of the banks has been improved by a reduction in member bank borrowing and a little curtailment in collateral loans; the Federal Reserve ratio is high
- 5.—Gold exports have been checked; time money rates are easier
- 6.—Sharp curtailment of industrial production is tending to restore the balance between demand and supply

UNFAVORABLE FACTORS

- 1.—Commodity prices continue to decline, including farm prices
- 2.—There was a large decrease in employment and payrolls in December
- 3.—Building activity is very low, construction contracts being the lowest since 1924, and permits the lowest since 1921
- 4.—December foreign trade decreased more than usual
- 5.—Railroad freight traffic and earnings have been declining
- 6.—Stocks of commodities in producers' hands have increased and are large
- 7.—Machine tool orders have dropped sharply
- 8.—Bank credit outside the large centers is much frozen; large collateral loans show that liquidation is not complete

THE more significant and fundamental factors continue unfavorable. Most of the favorable factors are rather negative. It is to be remembered that declining money rates reflect a reduced demand for funds and are not usually attended by business recovery until they become lower than they now are. Seasonal forces are now making for some recovery, and it is quite possible that fair seasonal gains will appear in some industries during the next month or two. Several months of recession and dullness, however, are probable before the necessary liquidation is accomplished and supply and demand come into balance in many commodity markets.

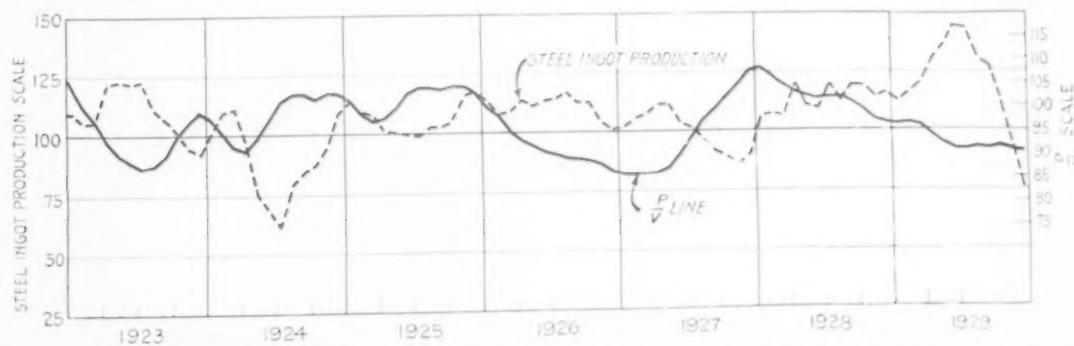
In addition to the foregoing, there is the fact that the P-V line declined further in December and is below normal. The P-V line is one of the very few among the forecasting "barometers" that has stood the test of time and change. Readers of THE IRON AGE will recall that it is based upon a ratio between commodity prices and the physical volume of trade, the theory being that if the physical volume increases without a proportionate rise in prices, the P-V line will decline and markets will be weaker. The demand intensity will be lower in comparison with the pressure to sell.

The P-V line ceased to rise in early 1928, indicating that the forces of expansion were checked. It declined gradually thereafter, as supply gained on demand, but it did not fall below estimated normal until April or May, 1929. Such a drop below normal marks the peak of the boom, and forecasts business recession. It did so in April, 1923, and again in April, 1926.

Our theory has been that steel making is so closely related to general business activity that the P-V line must give significant forecasts for the steel industry. In fact, declines in the P-V line have always preceded declines in steel production, anticipating major declines by from 8 to 10 months and minor ones by from 3 to 7 months. Above all, the declines below normal always come shortly before an important recession in steel making, and rises above normal shortly before upturns in steel.

No sustained recovery in steel production is yet forecast by this barometer.

Doctor Haney in the next number will discuss the general commodity price situation and in the Feb. 6 issue will probably address himself to the outlook in respect to steel demand.



The December Decline in the P-V Line Was Chiefly Due to Lower Commodity Prices. They fell more rapidly than did the physical volume of trade

This Issue in Brief

Cuts cost of producing irregularly shaped blanks by welding two sheets together, instead of using a larger sheet. Flash weld is strong and almost invisible.—Page 293.

* * *

Big profits in industry today are almost impossible of attainment without research. Concerns studying their products, markets and manufacturing methods are paying the largest dividends.—Page 291.

* * *

Short life of galvanizing pots is due to overheating. Hot zinc dissolves the steel in the pot at the spot where the steel is weakest and the temperature highest.—Page 296.

* * *

Fear of unemployment deters Japanese industry from fullest use of labor-saving equipment. In some cases machinery is bought and not used. Too many workers for jobs to be done.—Page 298.

* * *

High output is obtained from open-hearth furnace which can utilize variations in market prices of pig iron and scrap. Talbot process furnace produces 14 or 15 tons an hour, and makes heats in four hours.—Page 309.

* * *

"Temperature guessing" piles up costs. Many practical galvanizers scorn temperature recorders, and their "estimates" are cutting production and eating into profits.—Page 296.

* * *

Record year for fabricated structural steel industry. Total of 3,850,000 tons beats previous record year, 1928, by 17 per cent.—Page 348.

Efficient scheduling of work in machine shop is made easy by simple chart. Chart lists each machine by name and number, beside which is recorded hours of scheduled machining time. Production manager is thus able to arrange scheduling so that machines will be fully occupied.—Page 302.

* * *

Saves cost of new factory building by putting his product on conveyors during assembling. Gasoline pump manufacturer finds that small, flat track built into floor, connected with a roller conveyor at floor level, gives him added output in same floor space.—Page 300.

* * *

Error as high as 30 per cent may exist in formulas for small coil springs. Stress is not uniform across the section of the wire, engineer declares.—Page 303.

* * *

"Unfavorable," says Dr. Haney, regarding business factors. Several months of dullness are probable before necessary liquidation permits balance in many commodity markets.—Page 313.

* * *

New low-price alloy is high in corrosion resistance, but requires 50 per cent more working for fabrication than carbon steel. The French make it of chromium, copper and steel.—Page 348.

* * *

"Unfair competition," says Scrap Institute of steel makers' practice of buying scrap direct from customers. It may constitute price rebating, says scrap dealers' body, in plea for elimination of direct selling of scrap.—Page 307.

* * *

Are fears of a major depression unfounded? Can't tell yet, says Dr. Hardy, whether we are in the later stages of a mild recession or the early stages of a major depression. For both look alike at first. Facts now available are insufficient to determine severity or period of liquidation.—Page 319.

* * *

Stretching strain formation is eliminated from pressed parts. Budd finds way of treating sheets to prevent this defect, without reducing workability of the metal.—Page 292.

* * *

Saves heat by use of special dampers which shut open-hearth furnace tightly and keep it warm. Special design of valves and dampers on Talbot furnace lessens loss of heat during holiday shutdowns.—Page 309.

* * *

Fears falling off in export trade due to slump in raw-material prices. Buying power in foreign countries producing raw materials has been curtailed.—Page 319.

* * *

Instead of depressing assembly conveyor to convenient level for workers, gasoline pump manufacturer elevates the workman. Man on platform places glass tank on pump, while pump slides on tracks at floor level.—Page 300.

* * *

Cuts die costs by investigating just what combinations of materials will give greatest service at lowest first and maintenance cost. Automobile body builder finds it pays to study die service. Special analysis cast irons are devised; drawing compounds have been developed which increase die life and save stampings from imperfections.—Page 292.

Ten Topics for Machinery Meeting

Stabilizing Production and Employment, Depreciation Rates, Time Sales, Market Research

WASHINGTON, Jan. 21.—Replies to a letter soliciting suggestions for the program of the fifth conference of machinery and equipment associations, to be held in Washington on Feb. 3 at the Chamber of Commerce of the United States, has developed 10 topics which appear to be of most interest at the present time. They relate to stabilizing employment and production, establishing normal depreciation rates, time sales, controlling the "trade-in" evil, the promotion of standards, uniform cost accounting, industry statistics, cross-licensing of patents, association activities, market research.

Chairman E. F. DuBrul has asked members of the conference to indicate on a list the order of importance of the subjects to their respective groups, the purpose being to take up the topics in the order of their interest. It also was suggested that members advise as to the subjects with which they have had experience. Mr. DuBrul pointed out that unsuccessful experiences are often fully as illuminating as successful ones.

Stabilizing Employment

The subject of stabilizing employment and production was foremost at the business men's conference called by the Chamber of Commerce of the United States at the request of President Hoover. It is proposed that the associations indicate what the machinery industries should do to promote the program of the national chamber and how they can bring before their customers recommendations of the conference.

These recommendations provide for a study of production methods and facilities with a view to seeing which methods and processes could be improved and what equipment could be replaced. They urge the making of replacements during the present period of business recession instead of waiting until the next period of activity and again forcing a peak demand on the machinery industries.

Organized cooperation with the Bureau of Internal Revenue in arriving at basic depreciation rates is emphasized in the suggestions received by Mr. DuBrul, it being pointed out that the machinery industries will inevitably suffer if they do not take action in this direction.

Installment Selling

Whether or not time sales should be encouraged, how they are best financed, whether or not the sales paper should be turned over to finance corporations or is best handled by individual producers will also be discussed.

Pointing out that there are serious abuses in granting excessive allowances on used machinery as a means

of getting orders for new machines, the importance of controlling the trade-in evil is stressed by the letters received by Mr. DuBrul. It is stated that ways and means have been devised successfully by the Chicago machine tool dealers to separate the used machine from a new machine on a deal.

The machinery industries are also asked to cooperate in the formulation and promotion of standards, a subject that ties in with uniform cost accounting, which will be discussed with a view to getting the system established among machinery manufacturers.

Industry statistics will be considered from various angles. Attention will be directed to the work of associations with well developed programs, which make it possible for members to gage the relative action of supply and demand and what the trends are.

Restricting Tin Output and Stabilizing Prices

WASHINGTON, Jan. 21.—Proposed measures of the Tin Producers' Association for the restriction of output and "stabilization" of the price of tin "that will not encourage the increased use of tin substitutes" have created a great deal of interest to manufacturers of tin plate and other consumers in America, which purchases about one-half of the world's tin production, representing an annual outlay of about \$90,000,000. Reports from abroad coming to the Chamber of Commerce of the United States declare that the efforts of the majority of British producers to find a means of raising tin prices, held not to be bringing profits now, require cooperation among British, Dutch and other companies established in the Federated Malay States, the Dutch East Indies, and Bolivia, representing about 85 per cent of the world production. Although the great disparity in the production costs is perhaps the principal impediment to international production control, the most recent proposal of the Tin Producers' Association in London was said to have already had the effect of appreciably raising quotations of tin stocks on the London exchange.

The current plan for restriction replaces the former proposed control of stock at mines by limiting production "in order to restore the balance between supply and demand, and to re-establish the industry upon a sound and permanent footing." Recommendation was made by the council of the association "that throughout 1930 all mining operations shall cease from 10 p. m. on every Saturday until 6 a. m. on the following Monday. Further all mining operations shall cease for one week of seven clear days in

Information will be exchanged on successful methods of cross-licensing, a subject that is held to be of increasing importance among various machinery groups. Discussion will likewise deal with means of expanding the activities of associations that do not provide services that seem to be valuable to other groups of machinery builders.

Regarding market research it is stated that in a number of lines there has been unwise exploitation, manifested in the sale of equipment to users of such limited size that the overhead burden prevents the possibility of producing a profit. This, it was pointed out, merely weakens the market for particular classes of equipment by building up a bad competitive situation among the users of the equipment. Discussion will concern ways of making a group survey that will measure the obsolescence within a given user industry and the means of promoting the economic use of better machinery that will produce a final product at lower cost.

January, 1930, also for one week of seven clear days in February, 1930, and—if it be deemed necessary—also for one week of seven clear days in March, 1930."

These recommendations were made specifically applicable only to the East, but a similar ratio of curtailment is recommended in the case of Nigeria and other tin-producing countries upon a basis more exactly suited to the particular conditions obtaining in those fields.

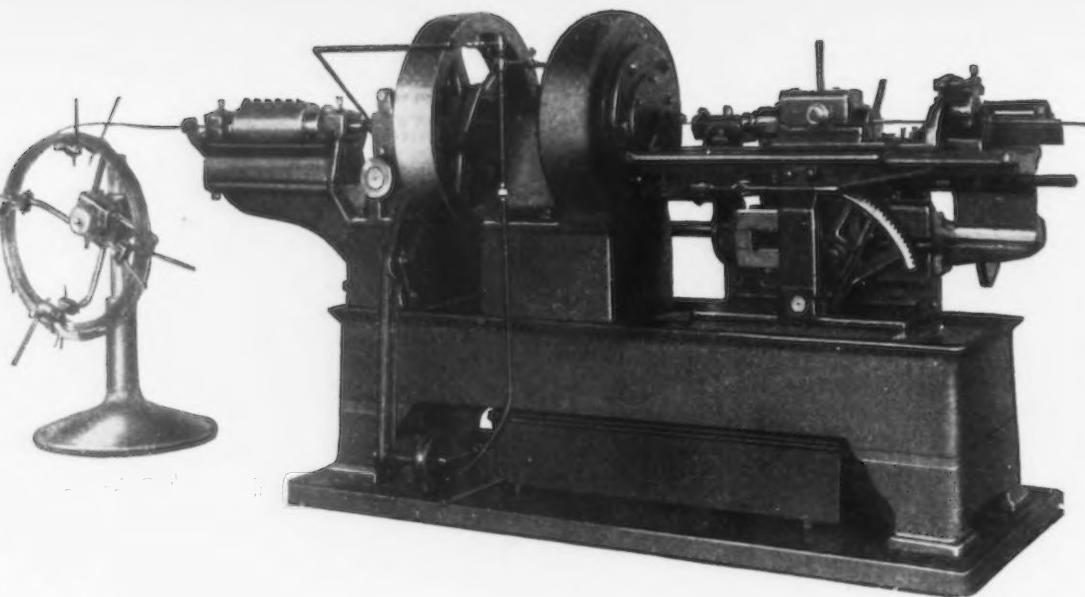
Two other events of importance to the industry were the recent formation of a holding company to combine four of the five principal smelting companies of the world, and the agreement for the amalgamation of three of the principal tin-mining and finance companies of Great Britain.

The new smelting combine merges the Eastern Smelting Co. of the British metal group, Williams Harvey Co. of the Patino group, the Penpol Smelting Co. of the Anglo-Oriental group and the Cornish Tin Smelting Co. The company will have a capitalization of about \$25,000,000. It was pointed out that the new smelting combine is "not necessarily prepared" to lend its support to the proposal of the Tin Producers' Association. The second merger of the tin finance companies will bring together all three of the Anglo-Oriental tin group.

Federal Specifications

Both an alphabetical and a numerical list of Federal specifications promulgated by the Federal Specifications Bureau are given in circular 378 of the United States Bureau of Standards. This pamphlet of 20 pages, of which 18 are taken up with the index and tabular classification, may be obtained for 5c. from the Superintendent of Documents, Government Printing Office, Washington.

WIRE Fed Continuously from the Coil Is Passed Through a Straightener and Up to the Dies. After swaging, the spoke is sheared to length. Operation is automatic.



Swaging Machine Makes Wire Spokes from Coils

FOR the production of automobile wire spokes, the Langelier Mfg. Co., Providence, R. I., has designed the special automatic machine here illustrated. Wire is fed continuously from the coil and passed through a rotary wire straightener into the rear end of the swaging spindle and up to the dies, where the reduced part of the spoke is swaged. After swaging, the spoke is sheared to length. Wire up to $\frac{1}{4}$ in. in diameter is worked, and spokes up to 10 in. long can be made.

The machine is made up of the company's No. 4 open-die swaging head mounted on one end of a long box bed, a wire straightener, which is supported on a projecting shelf at the rear of the swaging head, and the feeding and shearing mechanisms, which are mounted on the other end of the bed. Oil is delivered to the swaging head by means of a belt-driven pump.

The swaging head consists of a rotating spindle running in a bronze-bushed bearing. The working end of the spindle is enlarged and has a large slot cut across its front end. This slot is lined on all sides with hardened and ground steel plates riveted in place. A round spindle plate is tongued and lock-screwed to the front end of the spindle. The hammer-blocks and dies are made in pairs of special steel hardened and ground, and have a sliding fit in the spindle slot. The hammer-blocks have hardened and ground rollers in their striking ends. The front of the swaging head is bored to receive a large bushing. This bushing has ten holes bored equidistant in a circle. Into these holes are inserted the rollers, the inner diameter of the bushing being bored large enough to expose them.

As the spindle rotates, centrifugal force causes the hammer-blocks to fly out and make a striking contact with the rolls in the bushing; this causes the dies to open and close and swage the wire. With the spindle running at 300 r.p.m., 3000 blows in couples are

delivered each minute. Each hammer-block is made in two parts to permit wedges to be inserted between the halves to force out the finished spokes. The machine is driven by a two-

pulley drive countershaft, one pulley driving the swaging machine spindle and the other pulley driving the two-speed pulleys for the feeding mechanism. The wire straightener is driven by a separate countershaft. The floor space required is 44 x 101 in.

Jig Borer Drills, Locates and Center Punches

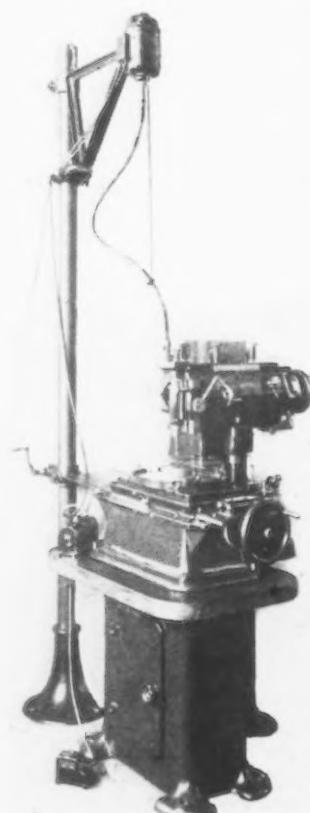
A JIG boring machine manufactured by Henri Hauser S. A., Biel, Switzerland, and recently placed on the American market by the Index Machinery Corporation, Cincinnati, is

illustrated below. This machine, which will bore, drill, locate and center punch, has capacity of 8 x 12 in., with a maximum vertical movement of 12 in.

The machine depends for its accuracy on the use of screws. The slides are operated by micrometer screws, the drums of which are divided into hundredths, while verniers enable readings to 0.0001 in. Wear in the screws is said to be hardly perceptible, the screws being employed only to bring the various attachments into the required position. When the machine is in operation the screws and nuts are not in use. The screw is pitched ten threads to the inch and the adjustments are made through fiber handwheels.

Drums are adjustable on the screws so that they can be set to zero at the start of the work. The screws mounted in the slides are entirely covered for protection against dust or accident. End play is eliminated by the use of counterweights. When the machine is not in use these counterweights may be released by shifting a lever, thus taking the strain off the mechanism. The micrometer screws are carried in hardened steel bushings and are hardened where they rotate in these bushings.

The manufacturer guarantees that the maximum error of displacement of the slides will not exceed 0.0005 in., while the tools supplied with the machine are interchangeable with a maximum difference of 0.0001 in. The division of the standard scale has no error exceeding 0.0002 in. The standard certificate for each scale indicates



The Capacity Is 8 x 12 In., with Maximum Vertical Movement of 12 In.

errors of divisions as closely as 0.00005 in.

The machine can be used for center punching as well as drilling; the holder for the punching device and microscope is adjusted vertically by rack and pinion. The boring tool and tool holder are co-axial. The locating microscope which is used for controlling and measuring magnifies 30 times. The goniometric microscope used for angle measurement magnifies 20 times. Its ocular has a revolving and a fixed thread, a graduated circle and a vernier providing readings in 2 min. The center punch device is controlled by a weight and after punching returns to its original position. It is co-axial with the drilling and boring fixture, the arbor of which is adjustable, its thrust being taken by adjustable ball bearings.

Drive is from a variable-speed motor through a flexible shaft suspended above the machine. The drilling spindle has a vertical travel of $2\frac{1}{4}$ in. Up to $\frac{3}{4}$ -in. holes can be bored with accuracy. The manufacturer supplies special end mills for the rapid opening and sizing of holes. The depth of a hole is determined through a scale. The working surface of the table is $9\frac{1}{8}$ in. by $17\frac{3}{16}$ in. A circular table 11 in. in diameter is also furnished and is divided into half degrees and a vernier movable in either direction permits readings in divisions of 2 min. A calibration scale and microscope are used for periodically checking the accuracy of the machine. The standard scale is 12 in. long and is divided into tenths.

Grinder Head for Cincinnati Planers

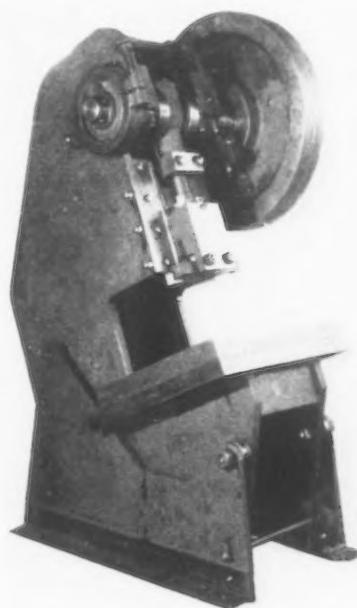
A SPECIAL grinder head for use on planers of any size has been added to the line of the Cincinnati Planer Co., Cincinnati. Use of this attachment with a cup wheel and 3-hp. driving motor, on a 30-in. medium-pattern planer, is illustrated here.

Vertical settings of the wheel can be made either from the end of the rail or by means of the crank handle on the head. Power feed is provided, permitting movement of the head across the work. The same attachment arranged to grind on the periphery of the wheel can also be furnished, both types having a place in die shop and toolroom work. The standard planer head can be left on the machine if general planing as well as

grinding is to be done. By means of the company's "Tu-Speed" counter-shaft two table speeds can be obtained; these speeds may be selected to suit the requirements of the work.

Inclinable Press with Frame of Welded Steel

INCLINABLE presses the bodies of which are made from steel plates cut to size and shape and electrically welded have been placed on the market by the LaSalle Machine Works, Inc., 3013 South LaSalle Street, Chi-



Welded Steel Construction Permits Variations in the Die Space and Throat Depth of Standard Size Presses

cago. The plates are machined before and after welding to assure alignment.

In addition to unusual strength and rigidity with less than the usual bulk, an advantage claimed is that standard machines of this construction may be

readily built to meet special requirements, such as increased die space, larger bed area and greater depth of throat, which variations from standard usually require selection of a larger press than necessary.

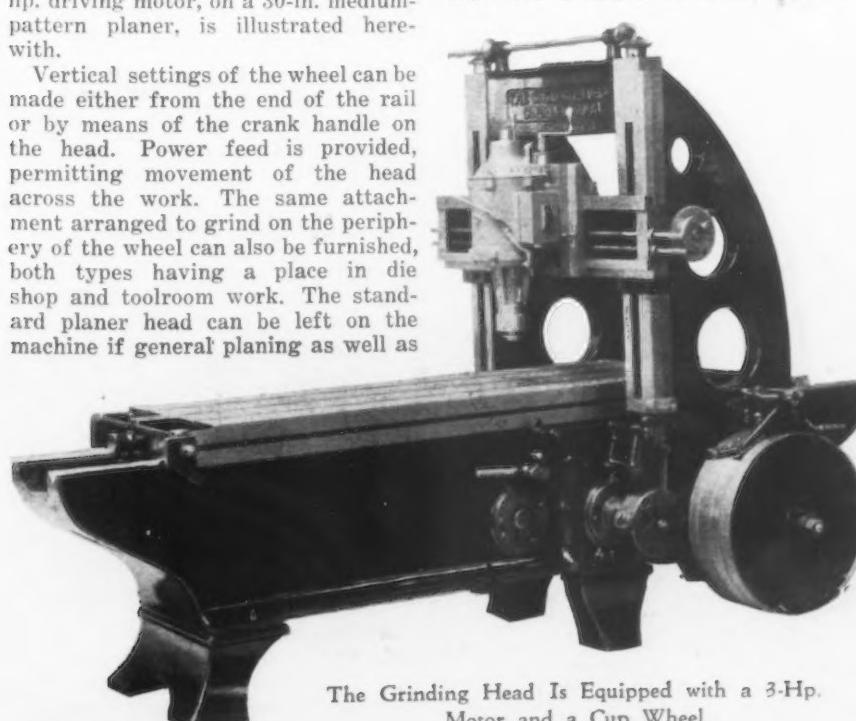
Safety Signals for Overhead Cranes

Considerable difference of opinion is expressed by various safety directors in reporting to the National Safety Council, Chicago, on signals to be used in connection with the operation of overhead electric traveling cranes. One company placed a 14-in. gong on the crane girder and attached a chain to the shaft on the bridge line. As the shaft revolves the chain strikes the gong at all times when the crane is in motion. Annoyance was reported, however, particularly to the crane operator, from the constant ringing of this gong.

Signals operated by hand or foot and sounded only when carrying loads over places where men are working were suggested by another safety director. This man stated that a continual signal ceases to be a warning for two reasons: It sounds whether the crane is empty or is carrying a load; the men become habituated to a constant signal and do not heed it, besides which it becomes a nervous menace because of unnecessary noise.

Threaded Parts Data Book

To assist engineers, designers and production executives in preparing threaded parts specifications, the Eastern Machine Screw Corporation, New Haven, Conn., has prepared a 60-page booklet entitled "Threaded Part Data Book." In addition to fundamental terms, definitions and other data from the National Screw Thread Commission's 1929 report, there are dimensional tables covering finished hexagon cap screw heads, castellated nuts, finished square and hexagon nuts, and Whitworth and other foreign threads, as well as tables of decimal and metric equivalents, cutting speeds, net production per hour, and S.A.E. standards for chemical composition of various classes of steels. The Screw Machine Products Association's standards relating to the conditions under which screw machine products are bought and sold are reprinted, and a section of the booklet gives information concerning the selection of die heads.



The Grinding Head Is Equipped with a 3-Hp Motor and a Cup Wheel

Information on scientific methods of daylighting and aeration of industrial buildings is given in two booklets published by the Detroit Steel Products Co., manufacturer of steel windows. The data in these books are based on seven years of experimentation by engineers of the Detroit Steel Products Co. in cooperation with the Department of Engineering Research, University of Michigan.

New Roll Grinder

Hydraulically-Equipped Machine Adapted for Rapid Grinding of Strip Steel and Other Small Rolls

FOR the rapid and accurate grinding of smaller diameter rolls, the Landis Tool Co., Waynesboro, Pa., is offering a new hydraulic roll grinder designated as the type B. The machine will grind roll bodies straight, concave or convex. It is built in four sizes, having 16, 20, 24 and 28-in. swing, respectively, and in lengths ranging from 8 to 16 ft., in increments of 2 ft.

Hydraulic work-carriage traverse and reversal is featured as providing almost unlimited number of speeds, and also smooth and quiet operation. End drive to the grinding wheel spindle is through multiple-V belts, which deliver full power under all operating conditions. A 30-in. diameter grinding wheel is employed. The crowning and concaving mechanism, which is of wide range and simple to operate, is claimed to be highly accurate.

The bed of the machine is of heavy box-type construction and is thoroughly ribbed. A portion of the base forms a reservoir for the oil, and the water tank is integral. The work carriage traverses on one V and one flat guide with thoroughly protected chilled surfaces. A swivel table is not supplied except on special order, the footstock being provided with a cross adjustment for maintaining alinement. The grinding wheel head is massive, and

is supported by a V and a flat guide having chilled surfaces. It is equipped with Landis adjustable steel-back babbitt bearings which are lubricated continuously by filtered oil. The base of the head casting contains a large oil reservoir.

The hydraulic system, of Landis design, is of low-pressure type and includes a variable-flow oil pump and a continuous hydraulic motor. The pump supplies oil only in the amount actually required, never working at maximum capacity unless required to do so because of heavy demands made by the machine. The continuous motor, which is of the two-chamber type, is capable of being rotated any number of revolutions in one direction, then reversed and rotated any number of revolutions in the opposite direction. Speed of the work-table traverse is determined by the volume of oil pumped. Both the pump and the motor are of simple design; bearings are of anti-friction type and all parts run in oil.

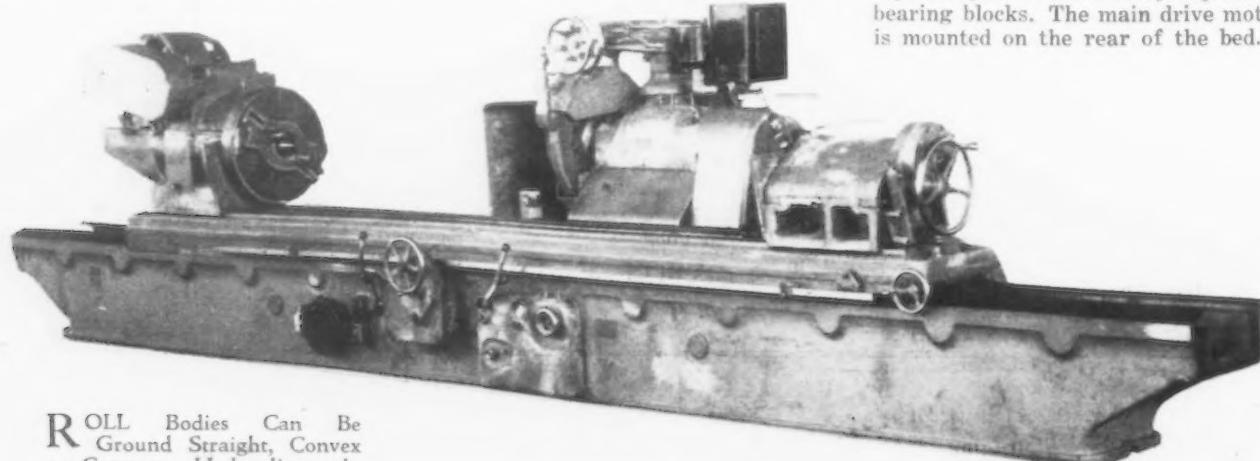
Grinding wheel feed is through a long screw and bronze half-nut. Rapid electrical wheel-head cross movement enables the operator to rapidly move the massive wheel-head forward or backward with minimum effort.

The crowning and concaving mechanism, of dual eccentric type, is en-

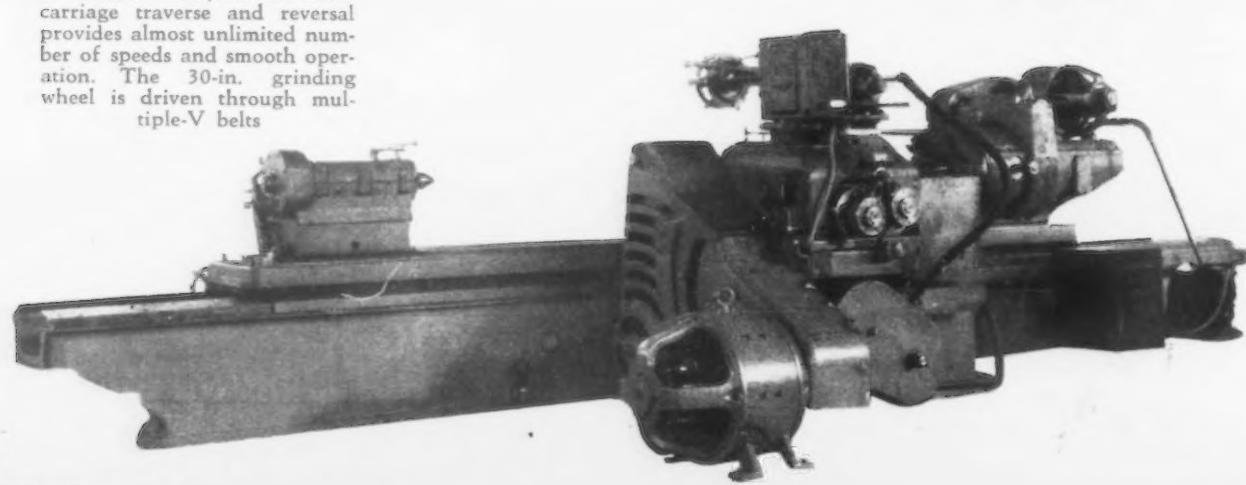
tirely inclosed and protected from grit and water. To obtain the amount of crown or concavity desired, it is only necessary to set and lock in position two large dials at the rear of the wheelbase. Each pair of change gears may be used for a wide range of work. The number of pairs required is dependent upon the variations in length of the rolls being ground and the amount of crown or concavity, but three pairs usually are sufficient for any job within the range of the machine. These change gears are accessibly located. The mechanism is driven from the carriage drive mechanism, the final drive to the two eccentrics being through worms and worm gears. It may be quickly disengaged for grinding journals or straight-face rolls. A crowning and concaving diamond holder clamped to the work-table trues the face of the wheel slightly convex, so that all of the grinding action will not take place at the edges of the wheel.

The head-stock of the machine is of live-spindle type, driven by a dynamically balanced variable-speed motor through multiple V-belts, worm and worm gear. A field rheostat gives a wide range of work speeds.

Another feature of the machine is the equalizing drive mechanism designed to drive the roll from opposite sides with equal pressure. The footstock is adjustable along the entire length of bed by means of a rack and pinion and is provided with cross movement. Roll-carrying heads are usually of the three-bearing type with separately and conveniently adjustable bearing blocks. The main drive motor is mounted on the rear of the bed.



ROLL Bodies Can Be Ground Straight, Convex or Concave. Hydraulic work-carriage traverse and reversal provides almost unlimited number of speeds and smooth operation. The 30-in. grinding wheel is driven through multiple-V belts



Will Low Raw Materials Delay Recovery?

Worldwide Slump in Prices of Raw Products Will Affect Foreign Trade, But Promises to Help Domestic Business—Active Bond Market Is Encouraging

BY DR. CHARLES O. HARDY

THE present business recession is running approximately true to the historical pattern familiar to students of business cycles. For this very reason the developments of the past month have done little to justify a more confident forecast of the extent of the current decline. Major depressions and minor recessions are typically so much alike in their early stages that it is difficult to decide whether we are in the later stages of a mild recession or in the early stages of a major depression.

Industrial production in December continued the abrupt downward course that characterized it in November. Reports for January, however, give some indication that the bottom may have been reached. Steel production is back to a 65 or 70 per cent basis as compared with 40 per cent late in December. Railroad buying continues to be good. Automobile buying of steel is depressed so much more than the scale of automobile manufacturing operations that producers must use up their inventories and reappear as buyers in the near future.

Too much weight should not be attached, however, to the first upward fluctuation. It will be remembered that early in 1924 the downward trend that had begun in the spring of 1923 was interrupted by a spurt of production which in two months made up half the decline of the preceding eight months, but all of this gain and much more was lost in the spring and early summer. In that case, however, the conservative tendency was aggravated by adverse political developments abroad and apprehensions of radical successes at home—apprehensions to which nothing in the present situation affords a parallel.

Bond Market Encouraging

One of the most encouraging features of the month's news is the improvement in the bond market. Last week's new bond issues totaled over \$300,000,000, or more than were reported in any week in nearly three years. The reappearance of an active bond market affords hope of improved buying capacity on the part of the construction industry, and particularly an increase in the volume of civil engineering projects. It also points to the probability of an increase in sales of foreign bonds, which may exert a favorable influence on our export trade. Improvement in the business situation on this account, however, will not be evident in the business records of the next two or three months.

¶ Improvement in bond market forecasts greater construction volume.

¶ Stock market collapse did not initiate business recession, though it accelerated it.

¶ Severe depression unlikely, since prices were not inflated and inventories were not abnormal except in automobile industry.

¶ Decline in silver and fall of raw material prices has clouded outlook for foreign trade.

¶ But we shall gain more than we lose from cheaper imported raw materials.

¶ Low prices of raw materials, including the products of our own farm belt, did not prevent the booms of 1923, 1926 and 1929.

of 1928 may be summarized as follows:

The downturn in stock prices which usually precedes a period of business liquidation did not come until after the tide of business activity had been receding for several months. Interest rates, on the other hand, reached a peak earlier than usual, turning downward before the stock market weakened. Money market conditions did not cause the stock market collapse nor did the stock market collapse initiate the business recession, though it undoubtedly accelerated it.

Commodity prices in most cases failed to exhibit the upward tendency which has always heretofore characterized periods of prosperity, the liquidation movement being signalized by an acceleration of a downward trend instead of the usual reversal of the direction of the movement. So far as we can judge from the rather scanty information available, the boom was never characterized by an accumulation of abnormal inventories, though the curtailment of production during recent months has necessarily resulted in some piling up of stocks of raw materials.

Motor Car Output Alone Was Overdone

The automobile industry furnishes the only important exception to our conclusion that business was not so overdone last summer as to make a recession inevitable. The ordinary demand and supply relationship in the automobile market has been disturbed for several years.

In 1927 and early 1928 there was a very severe underproduction in the low-priced car field, and the last half of 1928 and first half of 1929 the resulting shortage in consumers' supplies gave the market a deceptive power of absorption. The adjustment of producing schedules to this abnormal demand resulted in overproduction and the piling up of stocks of unsold cars in dealers' hands. The financing of these inventories put a strain on the credit structure of the country which was overlooked because of the exaggerated importance attached to the credit demands of the stock market. The long-continued shortage in the cheap car field also gave a misleading appearance of strength to the used car market which helped to bring about the overproduction of new cars.

These facts were just becoming recognized and operating schedules were

Must Analyze Boom to Understand Recession

All these facts are characteristic of a period of business liquidation, but none of them is of any real value in establishing a conclusion as to whether the current phase of liquidation will be prolonged and severe or short and mild. To get any light on these questions we have to go back to the events preceding the beginning of the liquidating period for a tentative theory, and then see whether current developments tend to support or to contradict it. The outstanding peculiarities of the peak of prosperity which characterized the summer and early fall

being adjusted downward, when the stock market collapse created a well reasoned fear that the high-priced car market might be due for a drastic readjustment. The consequent curtailment of activity, as was noted above, has been passed on to the iron and steel market in greatly exaggerated form.

Poor Outlook for Export Trade

Because of the absence of price inflation and inventory speculation in the commodity markets, and because of the absence of any major depressing factor outside the field of ordinary business influences, the writer believes that there is little likelihood of a prolonged and severe depression. This view has been presented in earlier articles and the events of the last month have done little either to strengthen or weaken the case for it. One adverse factor, however, to which we have not given attention is becoming increasingly conspicuous and must be taken account of. This is the unfavorable outlook for export trade, especially to countries which are dependent for their prosperity on the production of basic raw materials.

The number of foreign countries from which come reports of unfavorable business conditions is steadily increasing. The outlook for trade with silver countries and with China in particular has been rendered materially worse by the fall in the price of silver. Brazil faces apparently insuperable difficulties in her attempts to hold up the price of coffee without restricting production. Her recent success in floating a short-time loan in the London market seems to promise little more than an opportunity to add more weight to the hopelessly heavy load she is already carrying. Argentina reports bad crop prospects and a very stringent financial situation.

Germany stands to gain more over the next year or two than any other country from the revival of a bond market in this country, but her credit has suffered a severe blow from a series of recent failures and the current business depression in Central Europe is much more serious than in the United States. England also gives no promise of recovering quickly from the disorganization which has characterized her industrial life during most of the post-war era, and will be one of the chief sufferers if Oriental and South American trade continue to drag.

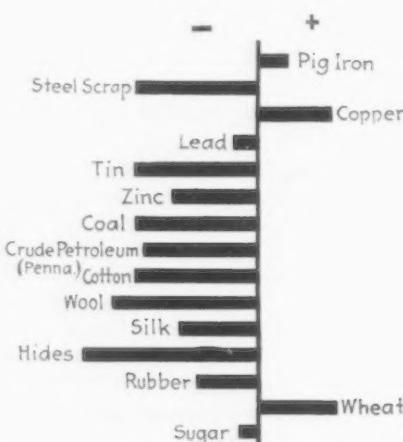
The export trade of the world consists chiefly of the export from certain countries of raw materials and products only slightly worked, and a counter-movement of industrial products. England with its coal trade and the United States with its exports of wheat and cotton are the only great industrial countries heavily interested in exporting raw materials.

Raw Material Prices Drop Still Further

Ever since 1920 the price situation has been unfavorable to the raw ma-

terial producing industries. Prices of oil, coal, most agricultural products, rubber, sugar, coffee, copper, silver, all have ranged below the general price level as compared with the pre-war situation, except when combinations for price control have afforded

1926 and 1929, and it does not appear that unfavorable prospects in these sections are incompatible with a revival of prosperity in 1930.



Price Changes of Industrial Raw Materials, December, 1928, to December, 1929

precarious relief. This price disadvantage, which is due primarily to the inferior ability of most raw material producing industries to control their own output, has become more acute during the past year.

To the persistent handicap offered by the organization of these industries there has now been added the tendency which always appears in a depression for raw material buying to slump excessively and industrial raw material prices to fall more than those of any other class of commodities. The accompanying chart indicates roughly the extent of the price decline of basic materials during the year.

Cheap Raw Products to Our Advantage

Insofar as the declines in these prices reflect the immediate demand situation in the United States, they must, of course, be classed as unfavorable symptoms. They are unfavorable, too, in that each of them reflects a weakening of buying power on the part of some important section of the world for our products. Viewed in the aggregate, however, and solely from a selfishly American standpoint, this tendency cannot be considered an unfavorable one. On balance we are the world's greatest purchaser of these basic raw materials and gain more than we lose by buying them at a ratio favorable to the producer of manufactured goods.

Our own basic raw materials, though low in price, are now on the whole depressed less than those we buy from the rest of the world. And more important, we are less dependent on foreign trade than is any other important nation. Price conditions in the raw material producing areas of the world, including our own farm belt, were bad in the booms of 1923,

Bond Issues Forecast Gain in Building

A large increase in bond issues definitely forecasts a sharp gain in construction, according to the Associated General Contractors of America. State and municipal bond issues floated in December increased more than 320 per cent compared with those sold in the preceding month. This is said to be the sharpest gain on record.

Statistics of the association show that \$275,377,000 worth of long-term bonds for public works were sold in December and the total is expected to exceed \$280,000,000 when complete information is received from all sections of the country. The amount exceeds by \$154,377,000 the average monthly sales for the largest bond year on record, and was surpassed only once—by December, 1921, when the total was \$313,000,000. The large bond issues of that month, it will be recalled, were followed by the great post-war construction boom of 1922 and subsequent years.

The contractors' association regards last month's showing as conclusive evidence that 1930 will be a banner construction year.

30 New Ships Take Upward of 100,000 Tons of Steel

WASHINGTON, Jan. 21.—Between 100,000 and 125,000 tons of steel, it is estimated, will be required for the 30 new ships of 300,000 gross tons to be built for 12 ocean mail routes. Postmaster General Brown has advertised for bids for mail carrying, and the ships are to be built under the mail contract and loan provisions of the Merchant Marine Act of 1928. Bids will be opened on Feb. 25 covering six routes and requiring 15 new ships; on Feb. 28, bids will be opened covering four routes requiring nine ships, and on March 31 bids will be opened covering two routes, requiring six ships.

Steel Exhibit to Be Held in Buffalo

An iron and steel exposition and steel industry display will be held at the Broadway Auditorium, Buffalo, on June 16 to 20, under the sponsorship of the Association of Iron and Steel Electrical Engineers. Problems of fuel, combustion, power, electricity and mechanics of the steel industry will be covered by practical demonstrations at the exposition, and the program for the week will also include technical sessions and discussions, as well as inspection trips to leading Buffalo industries. John F. Kelly, 1010 Empire Building, Pittsburgh, is in general charge.

Washington Predicts Record Construction

Estimates of Work to Be Undertaken by States, Railroads and Utilities Presage Greatest Volume for Peace Year

WASHINGTON, Jan. 21.—Expenditures for construction and maintenance of public works and public utilities in 1930 will reach the record total of \$7,000,000,000, according to an estimate made by Col. R. P. Lamont, Secretary of Commerce. His figures were based on statistics compiled by the new Construction Division of the Department of Commerce. This total does not include residence, commercial and industrial structures and other private operations, which last year totaled more than \$3,000,000,000.

Complete returns from the governors of 26 States, combined with conservative estimates based on partial returns from the remaining States, indicate probable expenditures for public works, including federal construction, of \$3,325,000,000 during the year.

Programs for betterments to plant and equipment, announced by public utilities, railroads and telegraph companies, represent expenditures of almost an equal amount during the year, or \$3,250,000,000.

According to Dr. John M. Gries, chief of the Construction Division, the designated expenditures for both types of construction are in excess of all previous records during times of peace.

In reporting the figures to Secretary Lamont, it was pointed out by Dr. Gries that in connection with public utility construction large amounts will also be spent for maintenance of

existing plant and equipment. This sum is estimated at \$410,000,000 for the electric, gas and street railroad companies alone.

According to the Construction Division the estimates of the governors of the 26 States which have filed complete figures are given in table.

Public utility construction programs, as announced, are divided into the following classes:

Class A railroads.....	\$1,050,000,000
Electric, gas, and street railroad companies	1,400,000,000
American Telephone & Telegraph Co.	700,000,000
Sub-total	\$3,150,000,000

Estimated total, including independent telephone companies, telegraph companies, short line railroads, etc., and privately owned waterworks

100,000,000

Total

\$3,250,000,000

Executive Board of National Business Conference Meets

WASHINGTON, Jan. 21.—The executive committee of the National Business Survey Conference will meet at the Chamber of Commerce of the United States on Thursday of the present week to review progress made in mobilizing forces of the country to stabilize and maintain business activity, to study reports made by the survey conference and to consider what

further steps may be taken to bring business factors into normal balance. The executive committee is headed by Owen D. Young, chairman of the General Electric Co. and the Radio Corporation of America, and among the other members are Myron C. Taylor, chairman of the finance committee, United States Steel Corporation; Clarence M. Woolley, chairman, American Radiator & Standard Sanitary Corporation, and Cornelius F. Kelley, president, Anaconda Copper Mining Co.

According to the national chamber, late reports summarizing conditions in a number of industrial and trade groups substantiate to an appreciable degree earlier promises of orderly adjustment and continuation of normal activity, with hesitancy, which had existed in some lines, disappearing. It was stated that in virtually all of the industries that have reported since the conference of Dec. 5 there have been indications of improvement and gathering momentum, with the outlook correspondingly clearer.

Taking of Distribution Census Begun

WASHINGTON, Jan. 21.—Taking of the first national distribution census was begun in the District of Columbia last Thursday when 50 special agents started canvassing the wholesale and retail trade. These agents later will be sent to other cities to supervise the census of manufactures and distribution. The questions in the distribution schedule included a description of the business; the number of proprietors or firm members; the number of paid employees, distinguishing those on full time from those on part time; the total amount paid in salaries or wages; the amount paid for rent, if premises are rented; interest for money borrowed; total labor expenses; stocks on hand; net sales, distinguishing cash sales from sales on credit.

Dr. R. J. McFall, chief statistician for distribution in the Bureau of the Census, said that this, the decennial census, had been authorized by Congress in response to a general demand on the part of business men and others for a knowledge of the basic facts regarding the national distribution system, in order that these facts may be used to make the system more efficient.

"We have," said Dr. McFall, "much more statistical information about production, such as agriculture and manufacturing, than we do about distribution. Partially, at least, as the result of having so much more information on production, this part of our business world has progressed in efficiency much more rapidly than has distribution. It is believed, therefore, that our distribution system can be considerably improved on the basis of the information which will come from this census and that improvements in distribution will help the merchants, manufacturers and farmers, and, in the end, will also prove beneficial to the consuming public."

ESTIMATED PUBLIC CONSTRUCTION FOR THE YEAR 1930		
State	Report Furnished by	Estimated Public Construc- tion in 1930
Arkansas	Gov. Harvey Parnell	\$35,178,650
California	Gov. C. C. Young	202,230,123
Connecticut	Gov. John H. Trumbull.....	40,000,000
Delaware	Gov. Clayton D. Buck.....	8,000,000
Florida	Gov. Doyle E. Carlton.....	19,483,366
Idaho	Gov. H. C. Baldridge.....	8,100,000
Kansas	Gov. Clyde M. Reed.....	46,104,561
Maine	Gov. William T. Gardiner.....	18,000,000
Massachusetts	Gov. Frank C. Allen.....	105,460,000
Missouri	Gov. Henry S. Caulfield.....	67,415,759
Montana	Gov. John E. Erickson.....	11,500,000
Nebraska	Gov. Arthur J. Weaver	32,000,000
New Hampshire	Gov. Charles W. Tobey.....	6,750,000
New Mexico	Gov. Richard C. Dillon.....	7,000,000
New York	Gov. Franklin D. Roosevelt.....	475,275,442
North Carolina	Gov. O. Max Gardner	36,000,000
North Dakota	Gov. George F. Shafer.....	7,000,000
Ohio	Gov. Myers Y. Cooper.....	233,225,000
Oregon	Gov. A. W. Norblad.....	29,500,000
South Carolina	Gov. John G. Richards	33,000,000
Texas	Gov. Dan Moody	180,000,000
Virginia	Gov. Henry Flood Byrd.....	41,000,000
Washington	Gov. Roland H. Hartley.....	37,000,000
West Virginia	Gov. William G. Conley	33,000,000
Wisconsin	Gov. Walter J. Kohler	61,430,000
Wyoming	Gov. Frank C. Emerson	5,090,000
Total, 26 States.....		\$1,778,742,901
Estimated total, remaining 22 States.....		1,275,000,000
Total		\$3,053,742,900

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Why Minimize Signs of Betterment?

THE new era enthusiast has passed—his place has been taken by the alarmist.

Aside from the assiduous efforts of certain economists to build up statistical evidence pointing to a major business depression—always with the injunction that we must bravely face the bitter facts—a succession of economic horrors is being dragged out further to frighten a public still trembling from the shock of the stock market panic.

"Frozen" securities in the hands of banks, "frozen" loans on such luxury items as furs, a sharp drop in the coffee market, a decline in silver to the lowest price in history, and a threatening gold famine are among the skeletons that have been brought out of the business closet.

Meanwhile our most basic industry—steel—has made an impressive recovery, now being on a 65 per cent production basis compared with 40 per cent late in December. But lest this improvement be taken at face value, it is contended that the gain reflects nothing more than post-inventory replenishment buying. Why purchasers should rush into a weak market to rebuild stocks beyond a safe minimum is not disclosed.

The bond market revived in December and last week saw the largest sale of new issues in time of peace, but the business man is reminded that the stimulative effects of increased building activity cannot be felt for months to come.

Admittedly business, as always, faces serious uncertainties. It is true that blind optimism is a menace to sound prosperity; yet pessimism can be carried to extremes. To destroy confidence is to discourage enterprise. In an atmosphere of gloom what was planned for today will be postponed until the morrow.

"It must not be forgotten," says Nicholas H. Dosker, vice-president, Louisville Trust Co., "that mental ills are just as real as physical ones and sometimes more difficult to cure, and for that reason the extent and duration of the present business slump will be largely measured by the time required in overcoming the effects of the present psychological reaction."

WELDING applications in the metal-working field are almost bewildering in their number, scope and speed of introduction. It seems but a short time when the chief function of welding, as it emerged from the blacksmith shop, was to patch up castings defective in surface or incomplete in contour. Then the equipment came into vogue to remove gates and risers in the foundry, and shortly we began to see such things

as pipe railings assembled with welded connections instead of threaded joints. Gradually there appeared various forms of rolled steel welded into complete machines, or parts of them. That such uses of welding were at first regarded as questionable merely proves how much ahead of current practice the leaders in the welding campaign were. Continued aggressiveness has brought the process into such good repute that the makers of welding equipment no longer stand alone in seeking new welding fields. They have the independent help of plant managers. The fact remains, however, that promotion will largely remain with the welding advocates, and it is this direct interest, vigorously fostered at all times and in all ways, that affords the striking example for those in other fields who, in this continued play of the forces of the new competition, so-called, would bring about the expansion which each desires. Yet, judging from the seeming indifference in some branches of industry, the lesson is not taken seriously, if indeed it has been learned.

Industry's Dependence on Industry

WHEN an automobile manufacturer can have an annual volume of business exceeding \$100,000,000 and tie up only \$500,000 of his capital in inventory—for every \$100 of sales have need for only 50 cents for supplies—it is not surprising that the banker waxes eloquent and seeks to set down the reasons. The Guardian-Detroit Bank, of Detroit, with this fact as a text, did this thing, in a booklet written for local distribution.

The enviable position of the motorcar builder is regarded as the result of mass production, with its steady, uninterrupted progression of manufacture from one end of the plant to the other; and also the result of dependable railroad performance, bringing material as needed. A modern miracle, the bank terms the situation, "since cash in payment of the finished product is received back into the till before payment for the raw material is even due."

The bank could have gone much further. How about the sources of material supply? Do they not have to be geared to make the prompt responses to demands the railroads do so well to deliver? The supplying industries, particularly the steel makers, have to carry large inventories of their raw materials as well as considerable lines of finished product, to serve as they desire their manufacturing customers. Were it not for the dependability of the sources of supply, manufacturing industries would not present the happy picture of well-maintained cycles of operations.

Competition has made for the development of all manner of service beyond the mere delivery of the purchases, but sometimes it seems as though much is taken for granted. Ordinarily the seller has expected no special consideration from the buyer, and perhaps keenness for orders will bring no change in this respect. It remains that there is a growing idea of a community of interests, that what is good for one group of industries is good for the others, that the one cannot long prosper at the expense of the rest. It goes without saying that sellers would always welcome a recognition of their problems, and just now the steel producers, with equipment and material investments that allow a capital turn-over only once in two years, are beginning to be articulate about the pressure on prices. Buyers must go slow, it is urged, not to impair unduly the purchasing power for their own products. The situation calls for a nice balance between the desire to secure concessions where there appears little power to resist and the wish to maintain stability for one's own product. Reason should reign with both buyer and seller.

Large Growth of Structural Steel

IN sixteen years from 1913 to 1929 fabricated structural steel orders more than tripled, and there has been a large proportionate growth in the last few years. Structural steel has been growing almost continuously from the start and the pace does not let down. In this latter respect structural steel is different from some other forms of steel, which reach a sort of maturity and then show a relatively small growth or none at all. The most conspicuous illustration of that is rails, which had their maximum production nearly a quarter century ago, with about 4,000,000 tons in 1906, while nowadays 3,000,000 tons makes a good rail year. There is even a chance of that tonnage eventually decreasing, on the score that rails now being laid are more durable on account of enlarged section and improved texture.

Some forms of steel grow rapidly by replacing something else, and then slowly when replacement is complete. At the outset fabricated structural steel was largely a replacement, but it soon grew far beyond things for which other material could be used. Furthermore, it has the peculiarity of increasing in tonnage for a given job more rapidly than the size of the job. Doubling the length of a bridge more than doubles the tonnage, while with a building of given ground area the steel per capita increases with the number of inhabitants to be taken care of. Apparently there is no maturity or saturation point for fabricated structural steel.

It is only a rough statement that from 1913 to 1929 fabricated structural steel lettings more than tripled. As tonnage fluctuates from year to year a more substantial comparison is obtained by averaging 1913-4-5 and comparing with 1929. The increase, in what may be called fifteen years, is 150 per cent, representing an average annual rate of increase of 6.3 per cent. Still another analysis, it may be mentioned in passing, was given in the Jan. 2 issue, on page 94.

Of course, a large increase is not surprising when total steel has been increasing, hence the relative increase should be noted. In 1913-4-5 as an average the

fabricated structural steel ordered represented 6.1 per cent of the total rolled iron and steel produced in those years, while orders placed last year represented 8.4 per cent of the year's rolled iron and steel production. Shipments of the fabricating shops, however, represented only 7.8 per cent, on account of the interesting point that the shops booked considerably more business last year than they completed.

Despite last year's relatively poor ending in trade generally, the year as a whole was a very good one in fabricated structural steel. November was the lightest month of the year in bookings, but December was only a trifle below the average in the first ten months. Department of Commerce reports of annual totals are given below, with apparent change in the combined order book of the shops.

Fabricated Structural Steel—Net Tons

	Bookings	Shipments	Excess Bookings + Excess Shipments —
1924 . . .	2,640,600	2,669,940	— 29,340
1925 . . .	2,980,730	2,998,080	— 17,350
1926 . . .	2,894,400	3,214,800	+320,400
1927 . . .	3,052,500	2,853,750	+198,750
1928 . . .	3,287,900	3,126,200	+161,700
1929 . . .	3,850,000	3,588,400	+261,600

The figures are not absolutely accurate, since there is some pro-rating, but they are amply close for practical purposes. Through 1926 the order book went down. That year, a good steel year generally, showed a slight decrease in bookings but a large increase in shipments. The order book on Jan. 1, 1927, was presumably of fair proportions, and the order book now, according to the figures, is 622,000 tons greater, the equivalent of fully two months of active work. That is one of the important backloggs of the steel trade.

List of Trade Names Reprinted

SUCH a generous response was given our letters to the American steel producing companies asking them to send information on the trademarks and trade names under which their rolled or forged products were sold that the index printed on page 275 of last week's issue is as complete as it is up to date. Doubtless some readers will wish more than one copy of it for reference purposes. For them, and for those who do not wish to mutilate their copy of THE IRON AGE by tearing it out, a reprint has been made. Copies will be gladly sent on request.

Automobiles as a Trade Index

OPINIONS are sometimes expressed indicating belief in a relationship between automobile demand and general trade activity. That is in a measure the belief when it is remarked that in depression the automobile industry will suffer more than industry in general, for in that case one is assuming that automobiles are a particularly sensitive indicator. We are anxious to discover sensitive indicators, for it is the observation of many business men that averages are too sluggish, being weighted by various things having inertia.

Accordingly we were prompted to make a study of the past, for if automobiles are an indicator, there are enough statistics to show the fact, and a proper analysis would show also whether they are particularly sensitive. We find that such is the case, as to the

general relationship and also as to the sensitiveness. The best test is a comparison of automobile production with general industrial activity as shown by the Federal Reserve Board's index. The board's index is compiled monthly, including manufacturing and mining, and is based on 1923-4-5 as 100. The board's annual averages are given in the first column of the table which follows, and we compiled a corresponding index of production of cars and trucks, United States and Canada, given in the second column, while the third column shows the second item divided by the first.

Relation of Automobile Production to Industrial Production in General

	General	Automobile	Relation
1923	101	101.6	101
1924	95	90.8	96
1925	104	107.6	103
1926	108	109.5	101
1927	106	87.0	82
1928	110	111.8	102
1929	118	136.0	115

One sees at a glance that, when industrial production in general went down, automobile production went down still more, and vice versa. There was a mild depression in 1924 and automobile production suffered more than general trade, being 4 per cent worse, so to speak, than general trade. Then 1927 was under both

the preceding and following year while automobile production was away down. That was the year when there was little Ford production, and not a few observers believed that the Ford inaction was largely responsible for the dip in total trade activity. Last year there was a decided bulge in industrial production while automobiles had a big bulge.

Incidentally the compilation brings out a separate point of decided interest. As both the industrial index and the automobile index are based on 1923-4-5 as 100, the figures for those three years (first two columns) add up 300 and necessarily the relationships (third column) for those three years add 300 also. But the third column figures for the last four years add up 400 exactly, which would not necessarily follow. In the first three years there was a certain relationship; in the next four years automobile production might have run above or below its former relationship with general industrial activity, but it underwent no change. Apparently one may view it that there was a deficit in 1927 and the deficit was made up in the next two years.

Thus there is furnished a definite historical basis for expectation that if automobiles do poorly this year general trade will do poorly, but not so poorly, and of course, to make the reference complete, one may say vice versa. This does not indicate which is cause and which effect, that being quite another story.

Specifications for Welding

Committees Discuss Ingots Iron Plate for Pressure Vessels, Welded Pipe and Steel for Welding

VARIOUS groups of the main committee on steel of the American Society for Testing Materials met in Philadelphia, Jan. 15 to 17, to consider changes in existing specifications, new specifications, or to confer on test programs.

Ingot Iron Plates for Pressure Vessels

One of the most important was the sub-committee on boiler steel, of which E. J. Edwards, engineer of tests, American Locomotive Co., Schenectady, N. Y., is chairman. This group has had under development for the past year a set of specifications for open-hearth iron to be used for pressure vessel work.

The need for such a specification was emphasized by the Boiler Code Committee of the American Society of Mechanical Engineers. The code committee was asked to approve the use of ingot iron for unfired pressure vessels, and since the materials specifications in the various sections of the boiler code are based on those of the American Society for Testing Materials, the latter body was requested to prepare adequate specifications. It has seemed best, however, to enlarge the scope to include open-hearth iron of very low metalloid content, similar products containing copper and other alloying elements, and open-hearth irons containing rather higher carbon and manganese. Such materials are made in considerable tonnage by several American producers, and all seem adaptable for the purpose indicated. Specifications for

this grade of material have therefore been drafted and were scrutinized by Mr. Edwards's committee.

Specifications for Fusion Welded Pipe

Sub-committee IX on Steel Tubing and Pipe, acting on a request from the American Standards Association, discussed the advisability of working up specifications for the various kinds of pipe which have recently invaded the field in competition with butt welded or lap welded pipe or seamless steel tubing.

The Republic Steel Co., through L. B. Grindley, manager metallurgical department, Youngstown, Ohio, also presented evidence to show that pipe made by the electric resistance method (Johnson patents) would pass all the tests required of lap welded or butt welded pipe in the "Standard Specification for Welded and Seamless Steel Pipe" (A 53-27), and requested that the wording should be amended to include the resistance welded product.

In view of the conflicting competitive situation it was decided that more rapid progress could be made by organizing a number of groups each one charged with the responsibility of preparing specifications for a single variety of pipe; viz. (a) resistance

welded, (b) hammer welded, (c) electric arc welded, (d) riveted and (e) lock-bar. The chairman, H. H. Morgan, Robert W. Hunt Co., Chicago, was therefore instructed to appoint the group leaders, and issue invitations to interested manufacturers and purchasers to participate in the work.

Steel for Welding

A sub-committee on steel for welding, under chairmanship of F. N. Speller, director department of metallurgy and research, National Tube Co., Pittsburgh, has had under consideration for the last two years a project for a specification whereunder low-carbon steel could be bought suitable for the manufacturer of piping, furniture and other products using fusion welded joints. Specifications for steel for forge or hammer welding already exist (A 78-27 and A 89-27).

As the matter developed, however, it appeared impossible to compress the matter in a single specification for two principal reasons (a) the wide range of products being welded—sheets, pipe, plate, shapes, even rails—and (b) the rapid advances being made in the technique of welding and the equipment for welding. It was generally agreed that the difficulties in making a sound joint increased as the carbon in the steel increased, and that 0.25 per cent carbon represented approximately the present line of demarcation beyond which special methods or special skill would be required. Furthermore it was agreed that seaminess, gas inclusions or other elements of quality have an important bearing on weldability into sound joints, yet these items have so far defied efforts to reduce them to speci-

fication. Lastly, it is known that the welding rod, and the technique of the welder play an important part—both matters which are being considered actively by the American Welding Society.

Consequently it was decided to report back to the main committee on steel that the following American Society for Testing Materials specifications cover steel which has been very successfully welded in quantity by present commercial fusion-welding processes:

- A 7-24 Structural steel for bridges.
- A 9-24 Structural steel for buildings.
- A 10 and 11-24 Structural steel for locomotives and cars.
- A 30-24 Boiler and firebox steel for locomotives.
- A 70-27 Boiler and firebox steel for stationary service.
- A 78-27 Steel plates of structural quality for forge welding.
- A 89-27 Steel plates of flange quality for forge welding.
- A 83-27 Lap welded and seamless steel and lap welded iron boiler tubes.
- A 53-27 Welded and seamless steel pipe.
- A 106-29 Lap welded and seamless steel pipe for high temperature service.

Metalware Institute, Inc., Adopts Code of Ethics

The Metalware Institute, Inc., 342 Madison Avenue, New York, comprising 80 per cent or more of the manufacturers of enameled ware cooking utensils, galvanized ware, tinware and stove pipe, elbows and drip pans in the United States and Canada, has adopted a code of ethics setting forth certain interpretations of the Clayton Act and the Federal Trade Commission Act.

A feature of the Metalware Institute's plan is an unfair competition bureau, which will investigate all complaints charging unfair methods of competition on the part of any one in the industry, whether a member of the institute or not.

General Refractories Buys Evens & Howard

The General Refractories Co., Philadelphia, has acquired all of the refractories properties of Evens & Howard Fire Brick Co., St. Louis. The Evens & Howard Fire Brick Co. has been a manufacturer of fire brick since 1857, with plants located at St. Louis and Stevens Pottery, Ga., having total combined daily capacity of 180,000 brick. The purchase includes clay lands in Missouri and Georgia.

This gives the General Refractories Co. 18 modern plants in Pennsylvania, Maryland, Kentucky, Illinois, Missouri and Georgia, with a total capacity of almost 1,200,000 brick a day.

The Evens & Howard Fire Brick Co. plants will be operated by the General Refractories Co. as the Evens & Howard Division.

The Week in Business

Drift of Current Financial and Economic Opinion

BOND issues floated last week totaled more than \$320,000,000, setting a new peace-time record.

This impressive showing promises well for construction activity later in the year. Meanwhile retail trade has held up better than had been expected. Department store sales for the entire country in December were only 2 per cent less than in the same month in 1928.

Although business readjustment is not yet completed, the Harvard Economic Service sees "indications that the severest phase of the recession is over . . . and that improvement will set in during the spring months."

A less sanguine view is taken by some of the other leading commentators, while the general public, still shaking from the shock of the stock market crash, remains supersensitive to pessimistic news. As Will Rogers might say, "Business like as not will be up and kickin' before they quit disputin' whether it can recover or not."

Silver Dips to New Low

The latest bugbears are sharp declines in silver and coffee prices.

On Jan. 8 silver dropped to the lowest level in history, the New York price having been 43 1/2c. a fine ounce. The trend of silver has been irregularly downward ever since 1926, when the Royal Commission on Indian Currency recommended the adoption of a gold standard for India and the eventual elimination of the baser metal.

Silver continues to be used in most of the Orient's retail trade, according to *Commerce and Finance*, which estimates that it is the medium of exchange for fully half of the world's population. In China, impairment of purchasing power, in the view of the Alexander Hamilton Institute, means heavy losses to importers and banks.

"It increases the burdens of the Government by requiring heavier expenditures to meet the interest and amortization of foreign debts. Estimates have placed the reduction in China's purchasing power at around 25 per cent, suggesting that a continuation of low silver prices will be felt by business houses which do an export business to China. There is, finally, the adverse effect upon producers of sil-

ver in the United States, Mexico and South American countries."

Gold Famine Near?

With silver growing cheaper, a serious gold shortage threatens, in the opinion of Prof. Irving Fisher of Yale, writing in the *New York Herald Tribune*. A gold famine—a possibility within two or three years, in his view, unless civilized governments take action to prevent it—would usher in a long period of declining prices.

Preventive measures may take the form of an intensification of economies put into practice in recent years. Central banks and national treasuries, the Stable Money Association points out, have taken over the greater part of the monetary gold formerly in circulation and in private banks—a total that accounted for nearly one-third of the world's stock as recently as 1913.

"The next step in this program of economy," it declares, "is to discontinue the practice of central banks bidding against each other for gold reserves. If some agreement could be reached whereby a general reduction in gold reserve ratios would take place whenever the average of prices appeared to be falling, this problem of gold shortage might be solved; and if the practice of dividing the gold stock into many parts, each located in a different center, were to be abandoned, the more easily could such a plan function."

Coffee Control Fails

Coffee prices in the New York Coffee and Sugar Exchange last week reached the lowest levels in more than 20 years. The decline was due to the difficulty encountered by the Brazilian Government in floating a loan in London to continue its price stabilization policy. Control of coffee prices was begun in Brazil in 1924. The first result was increased tree planting. In the crop-year 1927-28 Brazilian production jumped from an average of 14,000,000 bags in the preceding decade to 28,000,000 bags.

In the belief of several leading economists the breakdown of coffee stabilization, following the failure of British control of rubber, holds a timely lesson for the United States, in view of our own Government's use of public funds to influence prices of cotton and wheat.

Iron and Steel Markets

Demand and Output Still Rising

Further Gains in Steel Production at Chicago, Cleveland and Youngstown—Cold-Finished Bars and Black Sheets Are Lower—Buyers Remain Cautious

THE week has brought the steel industry a further gain in both demand and production. Improvement in business is not spectacular and, in view of the caution of buyers, mills still have difficulty in arranging their rolling schedules, but the encouraging fact is that specifications in the aggregate continue to increase. Current orders, in the main, are small and pressure for prompt deliveries indicates that much of the steel bought is destined for immediate consumption. Some buying undoubtedly has been for replenishment of depleted stocks, but price unsettlement has tended to hold such purchases to a minimum.

Steel specifications in the New York district thus far in January are double those for the corresponding period in December. At Cleveland, where heavier automotive business is a factor, the January bookings of several mills show a gain of 40 per cent over those of the previous month. Releases from the railroads are increasing, and Chicago rail mills have raised output to 87 per cent of capacity. Railroad car builders are taking more steel, while the requirements of farm equipment plants are well sustained.

Steel ingot production in the Chicago district now ranges from 70 to 75 per cent, compared with 65 per cent a week ago. Independent mills at Cleveland have reached a 70 per cent rate, and Youngstown production has shown an impressive recovery, now being between 60 and 65 per cent, compared with 50 to 55 per cent a fortnight ago. The average for the entire Greater Pittsburgh area is slightly above 65 per cent of capacity. The two leading steel companies remain on a 70 per cent basis and the average rate for the country at large is estimated at 67 per cent.

Pressure on prices is still severe, particularly in the Detroit district, where the operations of the automotive industry are slowly gathering momentum, with the makers of low-priced cars in the van. Efforts to hold bars at 1.90c. Pittsburgh, have been complicated by the existence of a lower base price at Cleveland. Cold-finished steel bars have declined \$2 a ton to 2.10c. a lb. Irregularities persist in sheet prices, with black sheets more commonly quoted at 2.60c., Pittsburgh, a recession of \$1 a ton following the \$2 drop of a week ago.

Reductions in finished steel suggest the possibility of a downward adjustment of semi-finished steel prices. Buyers of crude steel are taking more material on old contracts but are reluctant to make new commitments. While the market has had no real test, a concession of \$1 a ton on sheet bars has been reported in the Youngstown district.

The same spirit of caution that exists in the steel

trade also dominates the policy of pig iron buyers. Frequently smaller tonnages are bought than were inquired for, indicating a reluctance to order very far ahead. Furnace backlogs have shrunk, and on the Eastern seaboard Buffalo foundry iron has declined 50c. a ton. More active buying, however, is reported in the Central West, with sales of foundry and malleable grades by Cleveland interests totaling 32,500 tons. A maker of heating equipment in the St. Louis district purchased 12,000 tons, dividing the amount among Northern and Southern producers. An encouraging feature of the Southern market is an increase in the melt of cast iron pipe shops, which have booked a substantial volume of business from municipalities and utilities.

Cold weather has stimulated the demand for coke, but furnace grade at Connellsville, following the sale of distress tonnage, has declined 10c. a net ton to \$2.50.

Scrap markets are colorless, with little movement in prices one way or the other, but Pittsburgh reports an undertone of weakness.

Thirty ships to be built for 12 ocean mail routes under the provisions of the Merchant Marine Act of 1928 will require between 100,000 and 125,000 tons of steel. Bids will be opened on 15 vessels Feb. 25, while figures will be taken on the remainder Feb. 28 and March 31.

Fabricated steel bookings in December (computed) totaled 323,400 tons, compared with 227,150 tons in November. Lettings for the past week called for 25,000 tons, against 27,000 tons in the previous week. New projects totaled 10,500 tons.

Predictions of a good year in tin plate have been given support by a good volume of March specifications. Tin plate output now averages 75 per cent, with the leading interest at an 82 per cent rate.

Sheet sales of independent mills in December totaled 234,599 tons, compared with 134,391 tons in November, a gain of 75 per cent. Both production and shipments, however, were lower than in the preceding month, and unfilled orders on Jan. 1 were 443,127 tons, against 395,696 tons on Dec. 1.

Spot Straits tin was sold on Tuesday at 37 $\frac{3}{4}$ c. a lb., New York, the lowest price since July 5, 1923. Market weakness is due mainly to mounting stocks of unsold metal.

THE IRON AGE composite price for pig iron has declined from \$18.21 to \$18.17 a gross ton, the lowest level since October, 1928. The finished steel composite has receded from 2.319c. to 2.312c. a lb., its lowest since December, 1927.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Jan. 21, 1930	Jan. 14, 1930	Dec. 23, 1929	Jan. 22, 1929
No. 2 fdy., Philadelphia	\$20.76	\$20.76	\$20.76	\$21.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.	17.69	17.69	17.69	20.19
No. 2, Birmingham	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa.	19.50	19.50	19.50	19.75
Basic, Valley furnace	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	20.01
Malleable, Chicago*	20.00	20.00	20.00	20.00
Malleable, Valley	19.00	19.00	19.00	18.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	100.00	100.00	100.00	105.00

Rails, Billets, Etc., Per Gross Ton:

Rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	33.00
Sheet bars, Pittsburgh	34.00	34.00	34.00	34.00
Slabs, Pittsburgh	34.00	34.00	34.00	33.00
Forging billets, Pittsburgh	39.00	39.00	39.00	38.00
Wire rods, Pittsburgh	40.00	40.00	40.00	42.00
Cents	Cents	Cents	Cents	
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.90
Bars, Chicago	2.00	2.00	2.00	2.00
Bars, Cleveland	1.85	1.85	1.90	1.90
Bars, New York	2.24	2.24	2.24	2.24
Tank plates, Pittsburgh	1.80	1.80	1.90	1.90
Tank plates, Chicago	2.00	2.00	2.00	2.00
Tank plates, New York	2.02½	2.07½	2.17½	2.17½
Structural shapes, Pittsburgh	1.80	1.80	1.90	1.90
Structural shapes, Chicago	2.00	2.00	2.00	2.00
Structural shapes, New York	2.04½	2.09½	2.09½	2.14½
Cold-finished bars, Pittsburgh	2.10	2.20	2.30	2.20
Hot-rolled strips, Pittsburgh	1.80	1.80	1.90	1.80
Cold-rolled strips, Pittsburgh	2.65	2.65	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Orders for Sheets, Strip and Bars Better, But Other Products Show no Further Gains

PITTSBURGH, Jan. 21.—Within the past week orders for sheets, strip steel and bars have been in larger volume, though at the expense of prices in some instances. Other products have shown no further gains, the past week's orders, however, having equaled the average of preceding days of January.

Pittsburgh mills have had no occasion to make a further increase in ingot output, but a slightly higher rate is reported in the Valleys, where one company has blown in a blast furnace. In the Greater Pittsburgh district, open-hearth operations have not risen much, if any, above 65 per cent of rated capacity. This figure is fairly representative of the operation of all mills, not merely of a few of the large producers.

Demand for the various steel products is rather mixed. Sheets are moving only moderately well and, while considerable increase in specifications for hot-rolled strip is reported, demand for cold-rolled material has not improved correspondingly. Bars are growing more active, but price weakness is undoubtedly holding up some buying. All of these products would immediately feel any sustained improvement in automotive requirements. Pipe business has improved slightly, but it is too early to expect an increase in demand for butt-weld

material. Lapweld and seamless pipe shipments are mostly in small tonnages.

Pittsburgh mills are beginning to feel the improved prospects of the building industry, as several large reinforcing bar projects have recently come out for bids, and bridge work in the immediate Pittsburgh district will require large shape tonnages. Railroad car builders are specifying more freely, and the well sustained requirements of agricultural implement manufacturers are encouraging.

Pronounced price weakness contin-

ues on most of the principal products. The 1.90c., Pittsburgh, price on bars is subject to considerable pressure, particularly with plates and shapes at lower levels, but weakness in bars is not so marked in the immediate Pittsburgh vicinity as in markets such as Detroit, where the lower Cleveland base price is a factor. Cold-finished steel bars have also developed weakness in that territory, and quotations under the general market on sheets are encountered freely. Merchant wire products seem to be fairly well established at recent levels. Manufacturers' wire and wire rods are holding in this district.

The pig iron market continues very dull, while buying of scrap has been in improved volume. However, scrap prices have not advanced, and the market has a weak undertone.

Furnace coke is quotable at \$2.50 to \$2.60, Connellsburg, a decline of 10c. a ton, but the surplus which prompted this weakness is rapidly disappearing.

Pig Iron.—Improved buying, which was generally reported by sellers of pig iron in this district in the first two weeks of the month, is no longer so pronounced. Business is considered dull by most of the merchant inter-

ests. Some small lots are being sold from day to day, but this material is principally for immediate shipment, and furnaces are given no opportunity to build up a backlog. The National Radiator Corporation has bought 500 tons of foundry iron for its New Castle, Pa., plant from two Valley interests. The price is reported to have been \$18.50, furnace. This company's inquiry called for 1500 to 2000 tons. Pig iron buyers are not yet sure of their course for the first quarter, and consequently forward contracting is infrequent. Prices on small-lot sales are holding at \$18.50 for foundry and basic iron, and \$19 for malleable and Bessemer. The local merchant stack is out of blast.

<i>Prices per gross ton, f.o.b. Valley furnace:</i>	
Basic	\$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, \$1.75.

<i>Prices per gross ton, f.o.b. Pittsburgh district furnace:</i>	
Basic	\$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel.—Shipments continue to improve as the operations of non-integrated makers of sheets, strip and tin plate are stepped up, and the tonnage now moving is fully 50 per cent above that of December. However, new buying is extremely light, as present quotations on billets, slabs and sheet bars are rather high in comparison with the reduced asking prices on finished steel. Sheet bars have been sold in the Youngstown district for \$33, and buyers believe that the market will recede to this figure before long. As most users of semi-finished steel still have material coming to them on old contracts, there is no particular reason for making further commitments, and this condition helps to give the buyers an upper hand in the market. Wire rods are still quoted at \$40 by leading makers in this district, and in the immediate Pittsburgh territory this figure seems to be holding. Some pressure for lower quotations has resulted from the recent decline in prices on merchant

wire goods, but this has not led to an open market reduction.

Bars, Shapes and Plates.—Specifications continue to gain, and business thus far in January has been somewhat ahead of the expectations of some mills. Plate tonnage is coming in from railroad car builders at a good rate, and smaller users are specifying more freely. Ten barges for a local sand company, placed with two Pittsburgh yards, will require about 1500 tons of plates. Structural business is also being improved by numerous inquiries, although awards reported recently have not been heavy. Demand for merchant bars from the automobile industry has not expanded to any great extent, but tonnage releases show a steady improvement over those of December. The bar market is favorably influenced by several large inquiries for reinforcing steel, including 2500 tons for a sea wall at Port Arthur, Tex., and 2000 tons for a bridge at Rochester, N. Y. Bridge and road work in Allegheny County, on which bids will be taken in the near future, calls for about 900 tons. Prices have shown no marked change in the last week. Small users of plates and shapes are still paying 1.90c., Pittsburgh, in some cases, although buyers of consequence have no difficulty in getting the 1.80c. figure. Bars are still holding at 1.90c., Pittsburgh, in a general way, although mills in this district are forced to shade this price to get into the Detroit territory in competition with a lower Cleveland base price, and it is too early to tell whether the efforts of producers to maintain the present quotation will be successful. As stated last week, a 1.85c. price has come out in Pittsburgh on some spot business, although this figure has not been met freely by the two largest makers.

Rails and Track Accessories.—Specifications for track accessories are still rather heavy, but some producers question the possibility of a continuance of recent activity throughout February. Railroads can now generally be expected to ask for rush shipments at nearly all times, and, as they took little steel during December, the sudden increase in orders after the first of the year was not unexpected. The Baltimore & Ohio has closed on a substantial tonnage of

spikes for use in its 1930 rail-laying program, while the Erie has bought an unspecified tonnage of tie plates. Prices on track accessories are now comparatively steady, although the market is not entirely free from shading.

Tubular Goods.—Orders for pipe, as well as for other steel products, have increased since the first of the year, and operations have been stepped up in some mills. The industry is now running at nearly 50 per cent of capacity, as against 40 per cent, the estimated rate at the year-end. Recent orders have been largely for small line pipe projects, as seamless goods are quiet and it is yet too early for any seasonal increase in demand for butt-welded material. However, the prospect for standard butt-weld pipe is considered very good, and most makers are counting on a heavier tonnage than was shipped in 1929. Mechanical tubing is still rather quiet, as the airplane industry is taking little or no material at this time, and demand from the automobile makers has not attained sufficient volume to influence aggregate tonnage in any marked manner. News in the oil industry over the last few days has not been optimistic, and steel demand from that source may be seriously influenced by the efforts of the operators to curb production as well as by the reduced selling price of crude oil.

Wire Products.—Following reduced quotations on merchant wire products, the market has been in something of a turmoil during the last week, and producers have been extremely active in trying to prevent reductions on the products not covered in the price decline. With manufacturers' wire quoted at 2.40c., Pittsburgh, or 10c. a 100 lb. over wire nails, a differential is being set up which makers have been anxious to establish for some time. If the present quotations hold, and early indications in the immediate Pittsburgh district are that they may, a precedent will be established which will be of considerable benefit to wire sellers. Specifications for merchant wire products are very light, but manufacturers' wire is moving at a better rate, and new business taken thus far in January is encouraging.

Sheets.—Tonnage releases last

THE IRON AGE Composite Prices

Finished Steel

Jan. 21, 1930, 2.312c. a Lb.

One week ago	2.319c.
One month ago	2.362c.
One year ago	2.391c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

High

1929	2.412c., April 2;
1928	2.391c., Dec. 11;
1927	2.453c., Jan. 4;
1926	2.453c., Jan. 5;
1925	2.560c., Jan. 6:

Low

1929	2.362c., Oct. 29
1928	2.314c., Jan. 3
1927	2.293c., Oct. 25
1926	2.403c., May 18
1925	2.396c., Aug. 18

Pig Iron

Jan. 21, 1930, \$18.17 a Gross Ton

One week ago	\$18.21
One month ago	18.21
One year ago	18.42
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High

1929	\$18.71, May 14;
1928	18.59, Nov. 27;
1927	19.71, Jan. 4;
1926	21.54, Jan. 5;
1925	22.50, Jan. 13:

Low

1929	\$18.21, Dec. 17
1928	17.04, July 24
1927	17.54, Nov. 1
1926	19.46, July 13
1925	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
Del'd Philadelphia.....	2.22c.
Del'd New York.....	2.24c.
F.o.b. Cleveland.....	1.85c.
F.o.b. Cleveland.....	1.85c.
F.o.b. Lackawanna.....	2.00c.
F.o.b. Birmingham.....	2.05c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	1.95c.
F.o.b. Pittsburgh mills, cut lengths.....	2.20c.
F.o.b. Birmingham, mill lengths.....	2.05c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.90c.
F.o.b. Chicago Heights mill.....	1.85c.
Del'd Philadelphia.....	2.27c.

Iron

Common iron, f.o.b. Chicago.....	1.95c. to 2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.80c. to 1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
Del'd Cleveland.....	1.95c. to 2.04c.
Del'd Philadelphia.....	2.00c. to 2.05c.
F.o.b. Coatesville.....	1.90c. to 1.95c.
F.o.b. Sparrows Point.....	1.90c. to 1.95c.
F.o.b. Lackawanna.....	1.90c. to 1.95c.
Del'd New York.....	2.021/2c. to 2.071/2c.
C.i.f. Pacific ports.....	2.25c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.80c. to 1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
Del'd Cleveland.....	1.95c. to 2.04c.
Del'd Philadelphia.....	2.00c. to 2.05c.
F.o.b. Coatesville.....	1.90c. to 1.95c.
F.o.b. Sparrows Point.....	1.90c. to 1.95c.
F.o.b. Lackawanna.....	1.90c. to 1.95c.
Del'd New York.....	2.041/2c. to 2.091/2c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.90c. to 2.00c.
Wider than 6 in., P'gh.....	1.80c. to 1.90c.
6 in. and narrower, Chicago.....	2.00c. to 2.10c.
Wider than 6 in., Chicago.....	1.90c. to 2.00c.
Cooperage stock, P'gh.....	2.20c.
Cooperage stock, Chicago.....	2.30c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
To Merchant Trade

	Base per Keg
Standard wire nails.....	\$2.30 to \$2.40
Cement coated nails.....	2.30 to 2.40
Galvanized nails.....	4.30 to 4.40

	Base per Lb.
Polished staples.....	2.75c. to 2.85c.
Galvanized staples.....	3.00c. to 3.10c.
Barbed wire, galvanized.....	2.95c. to 3.05c.
Annealed fence wire.....	2.45c. to 2.55c.
Galvanized wire, No. 9.....	2.90c. to 3.10c.
Woven wire fence (per net ton to retailers).....	\$65.00

To Manufacturing Trade

	Base per Keg
Bright hard wire, Nos. 6 to 9 gage.....	2.40c.
Spring wire.....	3.50c.

(Carload lots, f.o.b. Chicago)

	Base per Keg
Wire nails.....	\$2.35 to \$2.45 (kkg)
Annealed fence wire.....	2.50c. to 2.60c. (lb.)
Bright hard wire to manufacturing trade.....	2.45c.

Anderson, Ind., mill prices are ordinarily

\$1 a ton over Pittsburgh base; Duluth
Minn., mill \$2 a ton over Pittsburgh, and
Birmingham mill \$3 a ton over Pittsburgh.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or North- umberland, Pa.	\$2.70
Less carloads, Wheeling or Reading.....	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh.....	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chi- cago dist.....	2.20c. to 2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham.....	2.25c. to 2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh.....	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.....	2.35c. to 2.45c.
No. 13, del'd Philadelphia.....	2.57c. to 2.67c.
No. 13, blue annealed, B'ham.....	2.40c. to 2.50c.

Continuous Mill Sheets

No. 10 gage, f.o.b. P'gh.....	1.90c. to 2.00c.
No. 13 gage, f.o.b. P'gh.....	2.00c. to 2.15c.

(Usual range 24 in. to 48 in. wide)

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.60c. to 2.75c.
No. 24, f.o.b. Chicago dist. mill.....	2.75c. to 2.85c.
No. 24, del'd Philadelphia.....	2.92c. to 3.07c.
No. 24, f.o.b. Birmingham.....	2.90c. to 3.00c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh.....	4.00c.
	Galvanized

Alloy Quality Bar Base, 2.65c. per Lb.

S.A.E. Series	Alloy
2000 (1/2% Nickel).....	\$0.25
2100 (1 1/4% Nickel).....	0.55
2300 (3 1/4% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bars.....	1.20
6100 Chromium Vanadium Spring Steel (flats).....	0.95
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying.

For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	\$36.00
Light (from rail steel), f.o.b. mill.....	\$34.00
Light (from billets), f.o.b. Ch'go mill.....	\$36.00

Track Equipment

Base per 100 Lb.

Spikes, 7/8 in. and larger.....	\$2.80
Spikes, 1/2 in. and smaller.....	2.80
Spikes, boat and barge.....</td	

week were about equal to the average for the month thus far, but few companies are able to report any marked increase. However, specifications at present justify an operating rate of fully 65 per cent of capacity, and a few full-finishing mills are running at a higher figure. It is also reported that the tonnage is fairly well distributed throughout the various finishes of sheets, indicating a diversified demand. Offsetting this favorable aspect are the weak price situation and the failure of the automobile industry to take sheets in significant volume. The Ford Motor Co. is the only one of the large automotive companies that is taking steel in a large way, and its production schedules in January have fallen somewhat behind original predictions. Steel shipments in greater or less volume are going to nearly all the companies in the Detroit territory, but they obviously represent what might be termed experimental production and increases in the output of cars reported last week were mostly accounted for by more companies getting into production, rather than by increases in the schedules of producers which are already turning out cars. Prices in Detroit are also disturbing to the entire market structure, and large buyers in that district do not seem to be satisfied with the \$2 a ton reductions which have been made in sheet prices since the first of the year. The market on black sheets in Michigan is said to be none too firm at 2.65c., Pittsburgh, although this figure represents the minimum in other territories. Otherwise, sheet prices are generally unchanged, with 3.40c. ruling on some galvanized tonnage and 3.30c. being quite common on jobber business and on manufacturers' tonnage in the Eastern territory. Automobile body sheets seem to be holding at 3.90c., but a few large buyers in Detroit talk of lower figures.

Tin Plate.—Specifications for March shipment are now reaching mills in considerable volume and bear out original predictions of a good year in tin plate. The industry is operating at about 75 per cent of capacity, with the leading interest at 82 per cent and one or two independents running at a slightly higher rate. The price situation is now considered satisfactory by leading makers.

Strip Steel.—The strip industry is running well when compared with December and November, but business is far from good in the light of past performances. Specifications are numerous, but the total tonnage is disappointing and improvement in automobile requirements is very slow. Hot mills are averaging about 50 per cent of capacity, but cold-rolling units are not doing much, if any, better than 25 per cent. Producers are encouraged by the fact that tonnage specified is for immediate shipment and that any slight improvement in the output of motor cars or other products requiring strip steel is immediately reflected in mill schedules. Prices are

unchanged, with present minimums applying on most of the new orders now being received, but with the top of the range still being obtained on small lots.

Cold-Finished Steel Bars.—Price concessions in Detroit have had a disturbing effect on the market situation, and makers of cold-finished steel bars are awaiting developments with interest. An open break in the merchant bar market would make it extremely difficult for cold-finishing mills to hold the present 2.20c., Pittsburgh, quotation. Specifications are improving gradually, and some large users have contracted for the first quarter at the present price level.

Coal and Coke.—Colder weather in the last week has stimulated demand for heating coke, and some sellers with supplies temporarily exhausted are making some effort to move furnace coke for heating purposes. The furnace coke market displays mixed trends and, while curtailed production has strengthened the situation somewhat, dealers are more anxious to dispose of their present stocks, with resultant price weakness. Quotations of \$2.50, Connellsburg, have become common. It is pointed out, however, that disposal of this distress tonnage will give the market more strength and probably result in higher prices by the first of the month. Foundry coke is dull and prices lack firmness.

Old Material.—Scattered buying by steel companies in this district and the reported purchase of a substantial tonnage by one consumer have not added strength to the scrap market, and quotations on the principal grades are unchanged. Weakness in the prices offered by dealers against recent sales, however, has given the market a softer undertone, and the scrap trade is inclined to believe that no further advances are imminent. Although the price paid for the prin-

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.70c. to 3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.35c. to 4.45c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.25c. to 3.35c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.40c. to 3.50c.
Galv. corrug. sheets (No. 28), per square	\$4.33
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count	60 per cent off list
Machine bolts, 100 count	60 per cent off list
Carriage bolts, 100 count	60 per cent off list
Nuts, all styles, 100 count	60 per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'l'd, base per 100 lb.	\$2.90 to 3.00
Wire, galv. soft, base per 100 lb.	2.90 to 3.00
Common wire nails, per kg.	2.80 to 2.90
Cement coated nails, per kg	2.95 to 3.05

cipal heavy melting steel purchase of the week was not reported, it is generally thought to have been as high as \$17. Another buyer of scrap is said to have turned down a dealer's offer of a substantial tonnage at \$16.50. Hydraulic compressed sheets have been sold at \$17 at at least two consuming points, but the market on this grade is weaker in Detroit, and this weakness may be reflected in the Pittsburgh market within a short time. Machine shop turnings have declined from their recent high level, while short shoveling steel turnings are quoted higher, as are the blast furnace grades. Car wheels are also slightly stronger.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel	\$16.50 to \$17.00
No. 2 heavy melting steel	14.50 to 15.00
Scrap rails	16.00 to 17.00
Compressed sheet steel	16.50 to 17.00
Bundled sheets, sides and ends	15.00 to 15.50
Cast iron carwheels	14.75 to 15.25
Sheet bar crops, ordinary	18.00 to 18.50
Heavy breakable cast	12.00 to 12.50
No. 2 railroad wrought	16.50 to 17.00
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	11.50 to 12.00

Acid Open-Hearth Grades:

Railr. knuckles and couplers	20.00 to 20.50
Railr. coil and leaf springs	20.00 to 20.50
Rolled steel wheels	20.00 to 20.50
Low phos. billet and bloom ends	21.00 to 22.00
Low phos. mill plates	20.50 to 21.00
Low phos. light grades	19.50 to 20.50
Low phos. sheet bar crops	20.50 to 21.00
Heavy steel axle turnings	14.00 to 14.50

Electric Furnace Grades:

Low phos. punchings	18.50 to 19.00
Hvy. steel axle turnings	14.00 to 14.50

Blast Furnace Grades:

Short shoveling steel turnings	12.00 to 12.50
Short mixed borings and turnings	11.50 to 12.00
Cast iron borings	11.50 to 12.00

Rolling Mill Grades:

Steel car axles	19.50 to 20.50
Cupola Grades:	

No. 1 cast	14.00 to 15.00
Rails 3 ft. and under	18.50 to 19.50

U. S. Steel Merges Cement Companies

The United States Steel Corporation has announced the consolidation of the Universal Portland Cement Co., its cement-making subsidiary, with the Atlas Portland Cement Co., under the name of the Universal Atlas Cement Co. Plants of the Universal Atlas Cement Co. are at Hudson, N. Y.; Northampton, Pa.; Universal, Pa.; Buffington, Ind.; Duluth, Minn.; Hannibal, Mo.; Independence, Kan.; Leeds, Ala., and Waco, Tex.

Largest Foundry Exhibit Already Assured

Prior to Jan. 1, the total of space requested for the 1930 exhibit of the American Foundrymen's Association, week of May 12, at Cleveland, was 4000 sq. ft. in excess of the total space used at the 1923 convention in Cleveland. Applications received since Jan. 1 and others that can be counted on for certainty assure the largest exhibit in the history of the association.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$34.00
Rerolling, 4-in. and under 10-in., Youngstown	34.00
Rerolling, 4-in. and under 10-in., Cleveland	34.00
Rerolling, 4-in. and under 10-in., Chicago	35.00
Forging quality, Pittsburgh	39.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$34.00
Youngstown	34.00
Cleveland	34.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	\$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$40.00
Cleveland	40.00
Chicago	41.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos., Swedish, average 65% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$15.50 to \$16.50
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	Per Lb. 50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50 to 2.60
Foundry, f.o.b. Connellsville prompt	3.50 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, 3/4-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard	\$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50
75%	130.00
10%	\$35.00
11%	37.00
12%	14 to 16%
	\$39.00
	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10%	\$30.00
11%	32.00
12%	\$34.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6%	\$22.00 to \$23.00
7%	23.00 to 24.00
8%	24.00 to 25.00
9%	25.00 to 26.00
10%	\$26.00 to \$28.00
11%	28.00 to 30.00
12%	30.00 to 32.00

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd

Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr, per lb. contained Cr, delivered, in carloads

Ferrovanadium, per lb. contained vanadium, f.o.b. furnace

Ferronickel, 15 to 18%, per net ton, f.o.b. furnace, in carloads

Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton

Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton

Ferronickel, 15 to 18%, per net ton

Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton

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Chicago

Steel Demands Gather Momentum—Ingot Output at 70 to 75 Per Cent of Capacity—Prices Easier

CHICAGO, Jan. 21.—The Western steel market continues to gain momentum. Ingot production stands well within the range of 70 to 75 per cent of capacity, and new releases assure the continuance of this rate. Sales of finished steel show a substantial gain over those of the previous week, and specifications are the largest so far this year. Although improvement in market conditions has been noted for several weeks, both producers and consumers are inclined to gage the situation with caution. Buying in large quantities is not a market factor. Current purchases are in small lots, and pressure for prompt deliveries is severe. In some directions there is shown a disposition to augment stocks, but most buyers prefer to take steel in accordance with immediate requirements.

Steel companies are producing pig iron in close conformity with actual needs of open-hearth furnaces. The use of cold pig is growing, indicating that more pig iron capacity will soon be put in blast.

Demand for steel for use in various oil and gas projects is expanding slowly. It is reported that final arrangements are being made for the gas line from the Southwest to Chicago, and other projects call for large tonnages for gas distributing lines in Illinois.

Inquiries for railroad bridge work are again appearing. The outlook for highway bridge construction is considered bright.

Prices of finished steel have not gathered strength. Plates, shapes and bars are still being quoted at 2c., Chicago, but a \$1 a ton concession is admittedly being offered to meet competition of outside mills. Iron bars and rail steel bars are off \$1 a ton, and all grades of sheets are selling at lower prices.

Ferroalloys.—Several carloads of spiegeleisen have been sold at \$34 a ton, Hazard, Pa. Specifications for this commodity show some improvement. Ferromanganese contracts are well covered, and releases are coming in more freely.

Bolts, Nuts and Rivets.—Specifications for these commodities are spotty, but in the aggregate are in larger volume than a week ago. The railroads have use for larger quantities and jobbers are adding to stocks. Discounts for bolts and nuts are holding at 70 per cent off list.

Pig Iron.—One merchant stack, the No. 3 Iroquois furnace, was blown out Friday for relining. This work was under way the following day, and it is planned by the operators to have this unit back in service in 60 days. Two Federal, two Iroquois and the Zenith furnace are now in blast. Production in the last two months has been in excess of shipments, and furnaces have been able to round out stocks, which were unusually low during most of 1929. Stock piles are now a trifle heavier than the 10-year average for this time of the year. New sales total three times the volume in the previous week, and inquiry is brisk, for future as well as for immediate needs. Northern foundry iron is steady at \$20 a ton, f.o.b. furnace. The price flurry of last week and the week before at Milwaukee has quieted, as the bulk of the tonnage offered has

not filled to the end of the week, and pressure by sellers to take business has weakened the price structure. Under present operating schedules, blue annealed sheet deliveries may be had in seven to 10 days, while galvanized and black sheets may be had in two weeks. Mills have accumulated stocks of roofing material, and shipments are prompt. It is evident that consumers are moving with caution. Here and there efforts are being made to round out stocks, but the bulk of tonnage moving from mills is for immediate consumption. Warehouse stocks are said to be below the size usually carried at this time of the year.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.80c. to 2.90c.; No. 24 galv., 3.45c. to 3.55c.; No. 10 blue ann'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Rails and Track Supplies.—The orders for 85,000 tons of standard-section rails for the Baltimore & Ohio, announced a week ago, were distributed as follows: 22,000 tons to Bethlehem Steel Co., 52,000 tons to Carnegie Steel Co., 6000 tons to Illinois Steel Co. and 5000 tons to Inland Steel Co. Releases against rail contracts are coming in freely, and Western mills have advanced output to an average of 87 per cent of capacity. Shipments so far this year are a trifle in excess of deliveries in the corresponding period a year ago. Two Western railroads have ordered a total of 8000 tons of track supplies. Fresh inquiries for these commodities are growing heavier as the season approaches for track laying operations. The light rail market is quiet, with orders confined to scattered car lots.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. **Per lb.:** Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07 1/4c. to 2.15c.; angle bars, 2.75c.

Hot-Rolled Strip.—Prices have given way \$2 a ton on large lots. Quotations now are 2c. to 2.10c. a lb., Chicago, for strips 6 in. and narrower, and 1.90c. to 2c., for strips wider than 6 in. Although specifications have been growing gradually, there is much room for improvement before mills can operate at a satisfactory rate. Shipments to automobile frame makers show a substantial increase, and schedules now being arranged for February delivery indicate a still heavier movement next month.

Cast Iron Pipe.—New orders are more numerous, but the general character of the cast iron pipe business is spotty, and sellers are not able to gage business more than a few weeks in advance. The American Cast Iron Pipe Co. has taken 700 tons of 6 to 16-in. pipe for Racine, Wis., and 6000 ft. of 6-in., 8000 ft. of 8-in. and 5000 ft. of 12-in. pipe for Minneapolis, Minn. The National Cast Iron Pipe Co. is said to have taken 275 tons of Class B pipe for delivery at Bismarck, Mo. Bay City, Mich., will open bids Jan. 24 on 3000 ft. of 4-in. and 6000 ft. of 6-in. pipe. On Feb. 5, St. Louis

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel. 1.95c. to 2.45c.	
Under 5 tons.....	2.85c.
5 tons to 30 tons.....	2.45c.
30 tons and over.....	2.00c.
Reinforc'g bars, rail steel.....	1.80c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands (1/4 in. in Nos. 10 and 12 gages).....	3.20c.
Hoops (No. 14 gage and lighter).....	3.75c.
Black sheets (No. 24).....	4.05c.
Galv. sheets (No. 24).....	4.60c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes, 1/4 in. and larger.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.

Per Cent Off List

Machine bolts	60
Carriage bolts	60
Couch or lag screws	60
Hot-pressed nuts, sq., tap, or blank	60
Hot-pressed nuts, hex., tap, or blank	60
No. 8 black ann'd wire, per 100 lb. \$3.45	
Corn. wire nails, base per keg. \$2.85 to 2.95	
Rivets, c't'd nails, base per keg	2.85 to 2.95

Park, a suburb of Minneapolis, Minn., will receive tenders on 8000 ft. of 6-in., 21,500 ft. of 8-in. and 26,600 ft. of 12-in. pipe and 190 hydrants and 40 tons of special castings. Private buying, though giving much promise, is slow in getting under way.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$42.20; 4-in., \$46.20; Class A and gas pipe, \$3 extra.

Reinforcing Bars.—With the Middle West in the grip of midwinter weather, this market remains dull. Awards during the week were confined to a few lots of less than 100 tons each. However, there is in early prospect an award of 1000 tons of rail steel reinforcing bars for a building at Harrison Street and Wabash Avenue, Chicago. A large sum of money will soon be available from several Sanitary District bond issues which were favorably voted on in 1929. This will provide funds for several large projects requiring a round tonnage of reinforcing bars. A fair tonnage will be used in buildings to be erected by the University of Chicago on the site of the old Hotel del Prado.

Warehouse Business.—Warehouses have cut prices on galvanized sheets to 4.60c. a lb., base, for No. 24 gage, for delivery in the metropolitan area of Chicago and several nearby counties. Competition in surrounding territory has forced a lower base price for No. 20 gage and lighter galvanized sheets. For delivery in outlying districts, the base price is 4.60c. for No. 18 gage and heavier and 4.35c., base, for No. 20 gage and lighter. The same differentials apply as heretofore.

Structural Material.—This market remains sluggish, with most shops in the district operating on short hours and actively seeking work at low prices. New inquiries from railroads total 1200 tons, and some work of this kind ordered last year has not yet been specified. Probably the most encouraging news of the week in the building line is the announcement that the Western Electric Co. will spend a large sum for buildings in which to house many units which are now scattered around Chicago.

Mill prices on plain material, per lb.: 2.00c. base, Chicago.

Old Material.—Tendencies in the Chicago scrap market are mixed. From some angles there appear to be signs of strength, while from others there is little indication that betterment is at hand. Heavy tonnage buyers still hold back and are resisting brokers' efforts to sell. While consumers stay out of the market, dealers are confronted with orders that are near completion and with high-priced railroad tonnages appearing on track. In this connection, it is interesting to observe that, notwithstanding severe weather conditions, railroad scrap is moving promptly. A round tonnage of heavy melting steel, which was not strictly No. 1 grade, has been sold at \$13, delivered Gary. Distress tonnages of cast iron borings are giving the trade some trouble. Increased production of steel ingots and a more widespread demand for scrap by small

users are encouraging market sidelights. Consumers in western Michigan are actively in the market and are paying prices above last week's local quotations. The grades being taken are 2-ft. rails, punchings, plate and machinery cast.

Prices deliv'd Chicago district consumers: Per Gross Ton

Basic Open-Hearth Grades:

Heavy melting steel.....	\$12.75 to \$13.25
Shoveling steel	12.75 to 13.25
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.50 to 12.00
Drop forge flashings.....	9.75 to 10.25
No. 1 busheling.....	11.00 to 11.50
Forg'd cast and r'l'd steel carwheels	17.50 to 18.00
Railroad tires, charg. box size	17.50 to 18.00
Railroad leaf springs cut apart	17.50 to 18.00

Acid Open-Hearth Grades:

Steel couplers and knuckles	16.00 to 16.50
Coil springs	18.00 to 18.50
Electric Furnace Grades:	

Axle turnings

Low phos. punchings.....

High phos. plates, 12 in.
and under

Blast Furnace Grades:

Axle turnings

Cast iron borings.....

Short shoveling turnings..

Machine shop turnings....

Rolling Mill Grades:

Iron rails

Rerolling rails

Cupola Grades:

Steel rails less than 3 ft. ..

Steel rails less than 2 ft. ..

Angle bars, steel

Cast iron carwheels.....

Malleable Grades:

Railroad

Agricultural

Miscellaneous:

*Relaying rails, 56 to 60 lb. 23.00 to 25.00

*Relaying rails, 65 lb. and
heav. 26.00 to 31.00

Per Net Ton

Rolling Mill Grades:

Iron angle and splice bars

Iron arch bars and transom
soms

Iron car axles.....

Steel car axles.....

No. 1 railroad wrought.....

No. 2 railroad wrought.....

No. 1 busheling.....

No. 2 busheling.....

Locomotive tires, smooth..

Pipes and flues.....

Cupola Grades:

No. 1 machinery cast.....

No. 1 railroad cast.....

No. 1 agricultural cast.....

Stove plate

Grate bars

Brake shoes

*Relaying rails, including angle bars to
match, are quoted f.o.b. dealers' yards.

Wire Products.—Demand for these commodities continues to improve at a slow pace. Movement of manufacturers' wire shows the greatest improvement from a wide circle of users. Jobbers are rounding out stocks in preparation for spring trade, the outlook for which is good. New orders received at mills are in good volume for this time of the year, when storms retard transportation and handicap salesmen in reaching trade. Demand for nails is seasonably dull.

Cold-Rolled Strip.—Heavier releases from automobile manufacturers are reflected in output, which now is 40 per cent of capacity, a gain of 10 points in the week.

Bars.—Bar mill operations in this district are at 75 per cent of capacity. Automobile parts' makers and forgers are on somewhat heavier production schedules, and farm machinery manu-

facturers are operating at near capacity. Prices for mild steel bars still show some variation, though the common quotation is 2c. a lb. for tonnages of average size. Producers of iron bars are openly naming 1.95c. to 2c., Chicago. Specifications for this commodity are light, and backlog are small. Demand for alloy steel bars from automobile manufacturers shows marked improvement, and mills have been stepped up to 55 per cent of capacity. Rail steel bars are now being quoted at 1.85c., Chicago Heights. Demand for prompt shipments of numerous small lots is inconsistent, and deliveries are less favorable than a week ago.

Plates.—Two fresh inquiries for storage tanks call for 7000 tons of plates. Total inquiry now stands at about 12,000 tons, and additional tonnage is in sight for projects that are making headway. Shipments of plates for pipe manufacture are light, but it is probable that releases will soon be issued against pipe contracts that were temporarily suspended. A large order for cracking stills brings a round tonnage of heavy plates into this market. It is reported that 300 automobile cars ordered last week by the Southern Pacific will be built in the Chicago district. Most sizes of plates may be had on short notice. The price structure remains as it was a week ago. Sellers consider 2c., Chicago, as the going price, though one producer from beyond the limits of the Chicago district is offering plates in the local market at 1.95c., and another seller has made this price to meet competition.

Coke.—Prices for by-product foundry coke are steady at \$8 a ton, f.o.b. local ovens. Production is at capacity, and shipments remain heavy.

Great Lakes Steel Orders a New Bar Mill

The Great Lakes Steel Corporation, Detroit, subsidiary of the National Steel Corporation, has placed an order with the Mesta Machine Co., Pittsburgh, for a continuous merchant bar mill to cost \$3,500,000. The new mill will embody the latest improvements in modern bar mill construction. Its capacity will be 20,000 tons a month and it will be able to roll a wide range of sizes.

The Donner-Hanna Coke Corporation, which is owned jointly by the National Steel Corporation and the Donner Steel Co., will erect another battery of 51 coke ovens to cost about \$2,000,000.

32 Planes Ordered by Navy

WASHINGTON, Jan. 21.—The Navy Department last week awarded contracts to the Chance Vought Corporation of Long Island for 36 amphibian Corsair type two-seated planes to be used aboard battleships and airplane carriers. The contracts involve \$856,812.

New York

Pig Iron Prices Easier on Small Sales—Plate Market Breaks to Low Levels

NEW YORK, Jan. 21.—The pig iron market has given further ground. Price weakness is no longer confined to the waiving of silicon differentials, but extends to the base grade. Relatively small tonnages now bring out prices as low as \$16.50 and \$16.75, Buffalo, for No. 2 plain. Furnaces have little business left on their books and buyers are in no haste to close for their requirements. Part of their hesitancy is attributed to the uncertainty of their own operations. Many of the smaller foundries are running irregularly and average melt for the district probably does not exceed 60 per cent of capacity. Pig iron shipments, however, show considerable improvement over those of last month. The A. P. Smith Mfg. Co., East Orange, N. J., is in the market for 300 tons of No. 2 plain and No. 2X for next quarter, and a Massachusetts melter wants 600 tons of No. 2 plain for that delivery, but, on the whole, interest in second quarter needs is very light. The Draper Corporation, Hopedale, Mass., has closed for 3000 tons of No. 2X and No. 1X for the current quarter. Sales in this district during the week totaled 7000 tons. The General Electric Co. has closed for the remainder of its Bayway, N. J., requirements, completing purchases against its recent inquiries.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil.	1.75
to 2.25	\$21.41 to \$21.91
*Buff. No. 2, del'd east.	
N. J.	19.78 to 20.28
East. Pa. No. 2 fdy., sil.	
1.75 to 2.25	19.89 to 21.02
East. Pa. No. 2X fdy., sil.	
2.25 to 2.75	20.39 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Ferroalloys.—Contracts covering 1930 requirements for ferromanganese and spiegeleisen are reported as having been made by most large consumers, at the prices announced early in December. Now and then a car-load lot for one or the other alloy is booked and there has been some business done in imported spiegeleisen. Contracts for ferrosilicon and ferrochromium for 1930 are reported as having been satisfactorily consummated.

Cast Iron Pipe.—For the first time in a number of months, quotations of Northern foundries on pressure pipe are beginning to advance. Recent bids have shown a range of \$34 to \$36 a ton, f.o.b. foundry, or \$36.60 to \$38.60, delivered New York. A substantial tonnage of gas and water pipe has been bought by private companies since the beginning of the year, and 30,000 tons or more is pending. The American Construction & Securities Co., New York, has distributed about

10,000 tons of pipe to five makers, two in the South and three in the North, and the United Gas Improvement Co., Philadelphia, is reported to have distributed 7000 tons to five foundries. Pending business includes an inquiry from Stevens & Wood, Inc., New York for 10,000 to 15,000 tons of pipe for the Allied Light & Power Co., bids opening Jan. 23. Providence, R. I., opened bids today on 600 tons of 12-in. water pipe, and the Boston Consolidated Gas Co. is reported to be inquiring for several thousand tons of gas pipe.

Prices per net ton deliv'd New York:
Water pipe, 6-in. and larger, \$36.60 to \$38.60; 4-in. and 5-in., \$33.60 to \$41.60; 3-in., \$46.60 to \$48.60. Class A and gas pipe \$3 extra.

Warehouse Business.—Buying from stock is at a low ebb, but prices are fairly well maintained except on sheets. Concessions of \$3 to \$5 a ton have been made on galvanized sheets, and black sheet prices have been shaded from \$2 to \$3 a ton. Blue annealed sheets are still subject to considerable reductions from the nominal price of 3.90c. a lb., base. Prices of lapwelded and seamless steel and charcoal iron boiler tubes have been revised upward.

Reinforcing Bars.—New buildings for the Western Electric Co. at Kearny, N. J., will take 2000 tons or more of reinforcing steel. Otherwise, the market is inactive, lettings being confined to jobs under 100 tons. Stock shipments from mills in cut lengths are quoted at 2.20c., Pittsburgh, and 2.54c., delivered New York.

Finished Steel.—A break in plate prices, largely localized in the metropolitan district, has within the past several days been a disturbing market factor, both to mills which do not want to meet the low prices quoted and to consumers and jobbers who have plates in stock which were bought at higher levels. Although much of the price cutting is attributed to one Eastern mill, some other mills have followed part way, and the general price level has declined at least \$1 a ton, or to 1.85c., Coatesville, Pa. The freight rate to New York is 17½c. a 100 lb. The extreme prices quoted are 1.70c., Coatesville, on universal plates and 1.80c., Coatesville, on sheared plates, but some mills have declined to meet these quotations. Structural shapes have settled to 2.04½c., New York, on the more attractive tonnages, but small-lot prices are \$1 or \$2 a ton higher. Steel bar prices have been reaffirmed at 1.90c., Pittsburgh, and no sales below that figure have been reported within the past week. Nearly all bar makers had quietly covered a good many of their best customers at 1.85c., so that a reduction of the gen-

eral market level to that figure will be resisted. Other consumers are not covering except for immediate requirements, evidently waiting to see whether the 1.90c. price will hold. Sheet prices have steadied at 2.65c. for black, 3.30c. for galvanized and 2.10c. and 2.25c. for No. 10 and No. 13 blue annealed sheets. Prices on hot-rolled and cold-rolled strip steel are holding at recently reduced levels. Structural steel lettings are featured

Warehouse Prices, f.o.b. New York

	Base per lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.50c.
Flats and squares	4.00c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'd sheets (No. 10)	3.25c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger	3.40c.
Smooth finish, 1 to $2\frac{1}{2}$ x $\frac{1}{4}$ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent
Machine bolts, cut threads:	Off List
$\frac{3}{4}$ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
$\frac{1}{2}$ x 6 in. and smaller	60
$\frac{3}{4}$ x 20 in. and smaller	50 to 50 and 10
Coach Screws:	
$\frac{1}{2}$ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

	Discounts on Welded Pipe
Standard Steel—	Black
$\frac{1}{2}$ -in. butt	46
$\frac{3}{4}$ -in. butt	51
1-3-in. butt	53
2 $\frac{1}{2}$ -6-in. lap	48
7 and 8-in. lap	44
11 and 12-in. lap	37
	Galv.
	29
	37
	39
	35
	17
	12

	Wrought Iron—
$\frac{1}{2}$ -in. butt	5
$\frac{3}{4}$ -in. butt	11
1-1 $\frac{1}{2}$ -in. butt	14
2-in. lap	5
3-6-in. lap	11
7-12-in. lap	3
	+19
	+9
	+6
	+14
	+6
	+16

	Tin Plate (14 x 20 in.)
	Prime
Coke, 100 lb. base box	\$6.45
	Seconds
Charcoal, per Box—	A AAA
IC	\$9.70
IX	12.00
IXX	13.90
	\$12.10
	14.25
	16.00

	Terne Plate (14 x 20 in.)
IC—20-lb. coating	\$10.00 to \$11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

	Sheets, Box Annealed—Black, C. R. One Pass
	Per Lb.

Nos. 18 to 20	3.60c. to 3.70c.
No. 22	3.75c. to 3.85c.
No. 24	3.80c. to 3.90c.
No. 26	3.90c. to 4.00c.
No. 28*	4.05c. to 4.15c.
No. 30	4.30c. to 4.40c.

	Sheets, Galvanized
No. 14	4.00c. to 4.15c.
No. 16	3.85c. to 4.00c.
No. 18	4.00c. to 4.15c.
No. 20	4.10c. to 4.25c.
No. 22	4.20c. to 4.35c.
No. 24†	4.35c. to 4.50c.
No. 26	4.60c. to 4.75c.
No. 28*	4.85c. to 5.00c.
No. 30	5.25c. to 5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

†For 50 bundles or more, 25c. per 100 lb. or less.

by 8000 tons for a Brooklyn telephone building. Pending business, aside from subway work, is not in large volume, but a good deal was disposed of in December and projects for spring are slow in coming into the market. General steel demand has shown marked improvement in the past week. For the month to date, sales by local steel offices have been at least double those of the corresponding period in December. While some buying is for replenishment of depleted stocks, a good many orders have resulted from new business received by steel consumers.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c.; plates, 2.02½c. to 2.07½c.; structural shapes, 2.04½c. to 2.14½c.

Coke.—Furnace coke prices show a downward tendency, with quotations at \$2.65 a net ton, Connellsville, and distress carloads still available at about \$2.50. Foundry coke is quiet, except for shipments on contracts. Special brands of beehive coke are quoted at \$4.85 a net ton, ovens, or \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn. By-product coke is quoted at \$9 to \$9.40, Newark or Jersey City, and \$10.06, New York or Brooklyn.

Old Material.—Prices of all grades are unchanged in a quiet market. Most consumers of scrap are unwilling to buy except at about 50c. a ton under their previous purchase price. Brokers are filling No. 1 heavy melting steel contracts at \$14 a ton, delivered eastern Pennsylvania, and report no difficulty in obtaining plenty of material at this price. With the market at a low level, export business has begun to develop. About 1000 tons of No. 1 heavy melting steel was shipped to Japan last week by a dealer in the New York district and another shipment of 2500 tons is scheduled for next week. In most cases, the Japanese buyers paid \$12 a ton, f.a.s. Representatives of a German scrap dealer have been seeking to make contracts for deliveries to Germany, and are reported to have offered up to \$13 a ton, f.a.s., for strictly No. 1 heavy melting steel.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$10.50 to \$11.35
Heavy melting steel (yard)	7.50 to 8.00
No. 1 hvy. breakable cast	9.75 to 10.50
Stove plate (steel works)	8.00
Locomotive grate bars	8.25
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.25 to 7.50
Cast borings (blast fur. or steel works)	7.00 to 7.50
Mixed borings and turnings	6.75 to 7.50
Steel car axles	15.25 to 16.25
Iron car axles	20.50 to 21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.25 to 9.75
Forge fire	8.50 to 9.00
No. 1 railroad wrought	11.50 to 12.50
No. 1 yard wrought, long	10.50 to 11.50
Rails for rolling	10.50 to 11.00
Stove plate (foundry)	8.25 to 8.50
Malleable cast (railroad)	12.50 to 13.00
Cast borings (chemical)	8.50 to 9.50

Prices per gross ton, deliv'd local founders:

No. 1 machry. cast	\$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

Cleveland

Gain in Steel Orders Maintained—Automobile Industry's Revival More Rapid Than Was Expected

CLEVELAND, Jan. 21.—The gain in orders for finished steel is being maintained, and the demand for a few products has further improved. Specifications taken by some of the mills this month show an increase of about 40 per cent over the corresponding period of December. The automotive industry continues to gain momentum slowly, but its revival appears to be more rapid than was expected a month ago. Manufacturers of low-priced cars are making a better showing in increasing their operations than makers of the higher-priced vehicles. Considerable new inquiry for automobile stampings has come to local stamping plants.

There has been a further slight increase in open-hearth operations in Cleveland, and local independent mills are now running at close to 70 per cent of ingot capacity.

Bids for the 11,500 freight cars and 130 locomotives for the Chesapeake & Ohio, Pere Marquette and Hocking Valley railroads will be closed Jan. 27. The Nickel Plate Railroad will receive bids Friday for track fasteners for 21,860 tons of rails recently purchased.

The steel market still has a weak tone. The most important price change is a reduction on plates and structural shapes. Sheets and strip steel are weak, and recent minimum quotations on these products have become more common.

Pig Iron.—The market became more active the past week, during which Cleveland interests sold 32,500 tons of foundry and malleable iron. Activity was centered largely in Michigan, Indiana and the Buffalo territory. Although some business was placed by nearby northern Ohio consumers, no local sales were reported. A northern Indiana automobile foundry bought 4000 tons of malleable iron, an Indianapolis motor car manufacturer 1000 tons of foundry grade and a Hamilton, Ohio, foundry 2500 tons. There were a number of other sales in lots up to 1000 tons. While a few sales were made for the first half, most of the contracts were for the present quarter or for iron for early shipment. Many foundries are buying from hand to mouth because they feel that present prices may not be maintained. Considerable pressure for lower prices is being exerted by some consumers. Some buyers who sent out sizable inquiries, on being quoted the prices that have prevailed recently, decided to purchase only a small lot for early needs. There has been some shading of differentials, but no irregularities in base prices are reported. Cleveland furnaces quote foundry and malleable iron at \$18.50, furnace, for out-of-town shipment and \$19 for local delivery. There is still a spread of \$19.50 to \$20, furnace, for shipment in the Michigan territory. Shipping orders show a moderate gain.

Strip Steel.—Demand for hot and cold-rolled strip is still rather light, orders for these products having improved to a lesser extent than those for sheets during the past few weeks. Very narrow cold-rolled strip that goes into industries outside of the automotive field is in fair demand.

There is little change in the price situation, although 1.80c., Pittsburgh, for wide strip and 1.90c. for narrow have become more common. Small lots are bringing \$2 a ton higher. Cold-rolled strip is steady at 2.65c., Cleveland.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., sil. 1.75 to 2.25	\$19.51 to 20.51
Malleable	19.50
Ohio silvery, 8 per cent	28.00
Basic Valley furnace	18.50
Stand. low phos., Valley	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Fluorspar.—A northern Ohio mill has placed a contract for its requirements for the first half at a slight concession from the regular price, but it is stated that the material will run somewhat less than the 85 per cent of calcium fluoride, which is the minimum percentage for the standard grade. Other consumers are taking no interest in the market, having as a rule carried considerable fluorspar over from the last quarter.

Semi-Finished Steel.—The leading local producer has closed contracts for the current quarter with most of its consumers at \$34, Cleveland, for sheet bars, billets and slabs. Sheet bar specifications continue to improve, but slabs and billets are moving slowly. Pressure for lower prices is expected as a result of the weakness in the finished steel market. Wire rods are being maintained at \$40, Cleveland.

Bars, Plates and Shapes.—Steel bars are in fair demand from forge shops, bolt and nut makers and other manufacturers allied with the motor

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinfore. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to 16 in. inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.75c.
Galvanized sheets (No. 24)	4.50c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	\$2.60
No. 9 galv. wire, per 100 lb.	3.05
Com. wire nails, base per keg	2.65

*Net base, including boxing and cutting to length.

car industry. Specifications for alloy steel bars show a decided gain. Plates are also moving better than recently. Orders include 300 tons for oil stills. Structural shapes are rather quiet as not much inquiry is coming out in the building field. Inquiry is out for reinforcing steel for piers for the Lorain-Central bridge, Cleveland, and bids are expected to be asked for in about 90 days for this bridge, which will require several thousand tons of structural shapes. Prices on plates and shapes in this market have settled to 1.85c., Pittsburgh, for the general run of orders, or a reduction of \$1 a ton, and first quarter contracts are being revised to that basis. Steel bars are being well maintained at 1.85c., Cleveland, although an occasional concession from that price is reported.

Sheets.—Mills are getting a fair volume of business, orders the past week having shown a slight gain over those of the preceding week. Some good-sized lots of automobile body sheets were placed for February and March delivery. Orders from the building industry have improved, but the demand is still light from manufacturers of steel partitions, barrels, stoves and refrigerators. Further weakness has appeared on black sheets, which are quoted as low as 2.55c., Pittsburgh. Otherwise, there is little change in the price situation. Auto body sheets appear firm at 3.90c. on blue annealed sheets, 2.25c. for No. 13 gage and 2.10c. for No. 10 have become more common. Continuous mill sheets are \$2 a ton lower than the above quotations, and the line is not closely drawn between the products of the two types of mills. On galvanized sheets, 3.30c. is pretty general.

Wire Products.—Orders for nails, annealed wire and fencing from dealers have improved since the recent price reductions. Manufacturers' wire is also moving somewhat better than recently. Prices appear stabilized at the revised quotations.

Reinforcing Bars.—Two jobs requiring 850 tons were taken during

Warehouse Prices, f.o.b. Philadelphia	
	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.70c.
Plates, $\frac{3}{8}$ -in.	2.90c.
Structural shapes.....	2.70c.
Soft steel bars, small shapes, iron bars (except bands).....	2.80c.
Round-edge iron.....	3.50c.
Round-edge steel, iron finished $1\frac{1}{2}$ x $1\frac{1}{4}$ in.	3.50c.
Round-edge steel planished.....	4.30c.
Reinforce. steel bars, sq. twisted and deform.	2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats.....	4.00c.
Steel hoops.....	2.55c.
Steel bands, No. 12 to $\frac{1}{2}$ -in. inclus.	3.30c.
Spring steel.....	5.00c.
*Black sheets (No. 24).	3.90c.
+Galvanized sheets (No. 24).	4.65c.
Light plates, blue annealed (No. 10)....	2.25c.
Blue ann'd sheets (No. 13)....	3.40c.
Diam. pat. floor plates— $\frac{1}{4}$ -in.	5.30c.
$\frac{3}{8}$ -in.	5.50c.
Rails.....	3.20c.
Swedish iron bars.....	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
+For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

the week by a Cleveland mill. Inquiry is not active, and prices are irregular.

Cold-Finished Steel Bars.—Concessions of \$2 a ton to 2.10c. have appeared. While orders have improved considerably since the first of the month, business is still below normal.

Coke.—The demand for foundry coke is moderate, although it shows some improvement. The recent cold spell has stimulated orders for by-product coke for domestic use, which is holding to the recently reduced price of \$4.50, Ohio ovens, for egg size. Ohio by-product foundry coke is quoted at \$8.25, ovens.

Old Material.—Local mills are taking scrap more freely than recently, and one consumer which has taken no steel-making scrap for several weeks is expected to release shipping orders Feb. 1. In the Valley district, scrap has been coming out so rapidly that two mills are holding up shipments. There is no new demand from consumers. However, activity among dealers has increased and the market has a firm tone. Dealers are paying \$14.50 to \$15 for selected No. 1 heavy melting steel, and offers of \$14 are reported for No. 2 steel. Machine shop turnings are bringing \$10.25 for

Cleveland delivery and short shoveling turnings \$12.50 to \$12.75 for Valley shipment. Blast furnace grades are firm, car lot sales having been made at \$10.50. Drop forge flashings have advanced 50c. a ton. Other prices are unchanged.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel.	\$13.50 to	\$14.00
No. 2 heavy melting steel.	13.00 to	13.50
Compressed sheet steel....	12.50 to	13.00
Light bundled sheet stampings.....	11.50 to	12.00
Drop forge flashings.....	12.00 to	12.50
Machine shop turnings....	9.75 to	10.25
Short shoveling turnings....	10.50 to	11.00
No. 1 railroad wrought....	13.00 to	13.50
No. 2 railroad wrought....	14.00 to	14.50
No. 1 busheling.....	12.00 to	12.50
Pipes and flues.....	9.00 to	9.50
Steel axle turnings.....	12.50 to	13.00

Acid Open-Hearth Grades:		
Low phos., forging crops..	17.75 to	18.00
Low phos., billet, bloom and slab crops.....	18.50 to	18.75
Low phos., sheet bar crops	18.00 to	18.50
Low phos., plate scrap....	18.00 to	18.50

Blast Furnace Grades:		
Cast iron borings.....	10.00 to	10.50
Mixed borings and short turnings	10.00 to	10.50
No. 2 busheling.....	10.00 to	10.50

Cupola Grades:		
No. 1 cast.....	15.25 to	15.75
Railroad grate bars.....	11.00 to	12.00
Stove plate	12.00 to	12.50
Rails under 3 ft.....	18.50 to	19.50
Miscellaneous:		
Railroad malleable	18.00 to	18.50
Rails for rolling.....	16.25 to	16.50

Philadelphia

Steel Buying Slightly Better But Mills Need Tonnage—Some Prices Are Weak

PHILADELPHIA, Jan. 21.—Improved operating rates of eastern Pennsylvania consumers of steel and the possible advantage in buying at present price levels have brought a slightly better volume of steel business, but mills are still in need of tonnage to maintain operations. Prices of bars and plates show a lack of firmness, but have not registered a further recession. The sheet market is soft, and large consumers of blue annealed, black and high finished automobile sheets are still obtaining concessions.

Shipyards in this district expect to quote on a number of vessels to be built for ocean mail contracts, including two 12,000-ton ships for a subsidiary of the Mallory Steamship Co. Steel barges and tugs being inquired for by railroads are expected to go to shipyards in some other district, as the eastern Pennsylvania builders are concentrating on the larger ships about to be awarded or in prospect. Building contracts in Philadelphia have reached a low level, but in the past week the general contract for the Baltimore & Ohio station, a \$10,000,000 project, has been awarded.

Pig Iron.—Foundry iron buying is increasing, but orders are still for small tonnages and early shipment. The Bureau of Supplies and Accounts of the Navy Department, Washington, has opened bids on about 530 tons of No. 3, No. 1X and No. 2X foundry iron for the Philadelphia, Brooklyn, Boston, Mare Island and the Portsmouth, Va., navy yards. Recent purchases by eastern Pennsylvania consumers have included about 200 tons by the Textile Machinery Works, Reading, Pa.; 300 tons by the Sanitary Co. of America, Linfield, Pa.; 300 tons by the J. L. Mott Co., Trenton, N. J., and about 200 tons by the East Penn Foundry Co., Macungie, Pa. Much of the small tonnage business is at \$20.50 a ton, furnace, but this is still shaded by 50c. a ton on larger lots. Upward of 5000 tons of basic iron was recently bought by an east-

ern Pennsylvania steel mill at about \$19.50 a ton, delivered. Low phosphorus pig iron is being bought in small lots and the price is firm. The furnace at Chester, Pa., which has been banked since late in December, resumed operation this week.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.76 to	\$21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26 to	22.26
East. Pa. No. 1X.....	21.72 to	22.76
Basic (del'd east. Pa.)....	19.50 to	19.75
Malleable	21.25 to	21.75
Stand. low phos. (f.o.b. east. Pa. furnace)....	24.00	
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to	24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29	
Va. No. 2X, 2.25 to 2.75 sil.	22.79	

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Bars.—Demand is still rather limited, but prices appear to have become stabilized at 1.90c. a lb., Pittsburgh, or 2.22c., delivered Philadelphia, which is being generally quoted on the small lots being offered at present.

Reinforcing Bars.—Bids have been submitted on a good tonnage of bars, but awards have been few. About 1000 tons of reinforcing bars for the Ohio River Boulevard, near Millvale, Pa., has been awarded to the McClintic-Marshall Co. Prices on billet steel bars are slightly firmer at 1.95c. a lb., Pittsburgh, or 2.27c., delivered Philadelphia, with the usual extra for cutting to length omitted. Rail steel bars range from 1.80c. to 1.90c., Franklin, Pa., and Tonawanda, N. Y., or 2.12c. to 2.22c., delivered Philadelphia.

Shapes.—Mills are in need of tonnage, and prices show a tendency to decline further. Sizable orders have brought out bids of 1.80c. a lb., f.o.b. mill, or 1.86c., delivered Philadelphia, while the range of prices on small orders is from 1.85c. to 1.95c., f.o.b. mill, or 1.91c. to 2.01c., delivered Philadelphia. Fabricated steel projects in this district are limited at present, but some large contracts are reported in preparation pending adequate financing. Should the War Department decide to use steel instead of wood for the proposed bulkhead in the Delaware River at Pea Patch Island, the 7000-ft. breakwater will require a considerable tonnage of sheet steel piling.

Plates.—New business is well distributed among various consuming industries, but orders are generally limited to small tonnages, so that the total being booked is no more than enough to maintain present operating schedules. Quotations range from 1.90c. to 1.95c., Coatesville, Pa., or 2c. to 2.05c. a lb., delivered Philadelphia.

Sheets.—Quotations to large users of black sheets have been shaded still further on recent business, but the openly quoted prices are 2.60c. to 2.65c. a lb., Pittsburgh, or 2.92c. to 2.97c., delivered Philadelphia. Galvanized sheets are lacking in strength, with the market at 3.30c. to 3.40c., Pittsburgh, or 3.62c. to 3.72c., delivered Philadelphia. Blue annealed sheets have settled to a range of 2.20c. to 2.25c. a lb., Pittsburgh, or 2.52c. to 2.57c., delivered Philadelphia, for No. 13 gage, and blue annealed plates are 2.10c., Pittsburgh, or 2.42c., delivered Philadelphia. These quotations generally apply on the jobbing mill sizes, as the continuous mill product is being quoted at 1.90c., Pittsburgh, or 2.22c., Philadelphia, for No. 10 gage plates and 2c., Pittsburgh, or 2.32c., delivered Philadelphia, for No. 13 gage sheets.

Imports.—In the week ended Jan. 18, 3259 tons of chrome ore arrived at this port, of which 2450 tons came from Portuguese Africa, 553 tons from Greece and 256 tons from British South Africa. A shipment of 148 tons of pig iron was received from Norway. Steel arrivals consisted of 125 tons of steel bars, of which 51

tons came from France, 50 tons from Belgium and 24 tons from Germany, 517 tons of steel blooms from France, and a total of 196 tons of structural shapes, of which 113 tons came from Belgium, 70 tons from Germany and 13 tons from the Netherlands.

Old Material.—Buying is limited to the filling of contracts by brokers. Consumers of No. 1 and No. 2 heavy melting steel are offering to buy at 50c. a ton less than their former buying prices, but brokers are still asking \$14.50 a ton, delivered, for No. 1 steel.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.	\$14.50
Scrap T rails.....	14.00
No. 2 heavy melting steel.	\$12.00 to 12.50
No. 1 railroad wrought (for steel works)	15.00 to 15.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	13.00
Hydraulic compressed, old	12.00 to 12.50
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equiv.)	12.50 to 13.00
Cast borings (for steel works and roll. mill)...	11.00
Heavy breakable cast (for steel works)	13.50 to 14.00
Railroad grate bars.....	11.00 to 11.50
Stove plate (for steel works)	11.00 to 11.50
No. 1 low phos. hvy., 0.04% and under	20.50 to 21.50
Couplers and knuckles.....	19.00 to 19.50
Rolled steel wheels.....	19.00 to 19.50
No. 1 blast furnace scrap.	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific)	14.00
Shafting.....	19.00
Steel axles.....	20.00 to 21.00
No. 1 forge fire.....	13.00 to 13.50
Cast iron carwheels.....	15.00
No. 1 cast.....	15.00 to 15.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling.....	15.00 to 15.50

Fabricated Plate Orders Less in 1929

WASHINGTON, Jan. 21.—Reflecting a decline of 21,927 tons, orders for fabricated steel plate in 1929 totaled 510,883 net tons, compared with 532,810 tons in 1928, according to reports received by the Department of Commerce from 48 firms. The rate of operation last year was 53.5 per cent, against 55.8 per cent in the preceding year. The decrease in orders last year was due solely to a heavy drop in bookings for oil storage tanks.

All other sources of consumption took greater tonnages last year than in 1928. Orders for refinery materials and equipment totaled 49,553 tons, against 41,251 tons. Tank car orders were 47,793 tons, compared with 26,643 tons. Orders for gas holders amounted to 42,670 tons, against 31,723 tons, while orders for blast furnaces were 12,127 tons, against 8314 tons, and for stacks and miscellaneous they were 219,796 tons, compared with 182,116 tons.

Orders in December dropped to 22,552 tons, against 42,295 tons in November, the respective rates of operation being 28.7 per cent and 52.8 per cent. December orders were distributed as follows: Oil storage tanks, 3669 tons; refinery materials and equipment, 2749 tons; tank cars, 1873 tons; gas holders, 549 tons; blast furnaces, 1529 tons; and stacks and miscellaneous, 12,183 tons.

December Sheet Sales Gained 75 Per Cent

The upturn in the automotive industry is indicated by a sharp increase in sales of steel sheets during December, as is shown by the monthly report of the National Association of Flat Rolled Steel Manufacturers, Cleveland. Sales by independent mills last month amounted to 234,599 net tons, compared with 134,391 tons in November, a gain of about 75 per cent. However, production and shipments during December, reflecting the curtailment of the automotive industry late last year, were the lowest for any month in several years. December production was 181,916 tons, compared with 204,071 tons in November. Shipments declined to 178,575 tons, against 207,200 tons in November. Unfilled orders on Jan. 1 showed a sharp increase, having been 443,127 tons, compared with 395,696 tons on Dec. 1. The December report and comparisons in net tons follow:

	Dec.	Nov.	Oct.
Total number of mills....	704	708	712
Capacity per month	452,700	461,800	498,300
Percentage reporting	67.0	67.1	67.3
Sales	234,599	134,391	258,810
Production	181,916	204,071	319,660
Shipments	178,575	207,200	291,135
Unfilled orders	443,127	395,696	478,038
Unshipped orders	101,008	107,056	106,216
Unsold stocks..	72,611	71,680	63,174
<i>Percentages of Capacity</i>			
Sales	77.4	43.3	77.2
Production	60.0	65.8	95.3
Shipments	58.9	86.8	86.8
Unfilled orders	146.2	127.6	142.6
Unshipped orders	33.3	34.5	31.7
Unsold stocks..	24.0	23.1	18.8

Scrap Rates Reduced from Newport News, Va.

WASHINGTON, Jan. 21.—Effective April 14, rates on iron or steel scrap, in carloads, from Newport News, Va., to certain destinations in Maryland, Delaware, New Jersey and eastern Pennsylvania and from Newport News and Richmond, Va., to Baltimore have been ordered reduced to 70 per cent of the basic scale prescribed on manufactured iron and steel products in the general iron and steel rate case covering rates throughout Official Classification territory.

The rate to Philadelphia and to points in the Philadelphia district, including Claymont, Del., Chester, Coatesville and Modena, Pa., was held not to be unreasonable and was left unchanged at \$3.78 a gross ton. The rate of \$3.78 from Norfolk and Portsmouth, Va., to Baltimore also was held not to be unreasonable. The rate of \$3.78 from Newport News to Baltimore was reduced 2c., the minimum reduction provided in the decision, to \$3.76, while the rate of \$3.78 from Richmond to Baltimore will be cut 42c. a ton to \$3.36. The greatest reduction is 99c. a ton, the result of the new rate of \$4.55 from Newport News to Bethlehem, Pa., the existing rate being \$5.54.

Birmingham

First Quarter Pig Iron Selling Proceeds Slowly—Steel Demand in Fair Volume

BIRMINGHAM, Jan. 21.—Sales of first quarter pig iron have increased from week to week, but the net gain has not placed the market on a basis that could be termed active. The amount of first quarter iron sold is light compared with this time in previous quarters. Apparently, melters have no desire to buy before they use up iron due them on old contracts. Those who failed to take all the iron on their fourth quarter commitments were permitted to carry over the balance at the old price of \$14.50. Current sales in the district have been made at \$15. Several of the small foundries that have been down for inventories and repairs are to resume operations this week. Their iron stocks are light. Pig iron stocks of pipe shops are being reduced due to increasing melt. The Tennessee company blew in its No. 6 Ensley furnace Jan. 14 and changed its Bessemer No. 4 furnace from recarburizing to foundry iron. Sixteen furnaces are now active. Nine are on foundry iron, six on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdly.	1.75 to 2.25	sl.	\$14.50 to \$15.00
No. 1 fdly.	2.25 to 2.75	sl.	15.00 to 15.50
Basic			14.50 to 15.00

Finished Steel.—Backlogs in the major steel lines have been well maintained. Recent reports from the users of bars, plates and structural shapes indicate a well sustained demand for the next several weeks. Tank fabricators report a more favorable outlook. Several important inquiries have already been received on galvanized sheets for early spring delivery. Structural steel fabricators

have experienced another light week, but they expect some of the large pending projects to be placed by next week. Reinforcing bar manufacturers report a light demand about normal for this season. Active open-hearts total 20, one more than last week.

Cast Iron Pipe.—Pressure pipe producers continue to increase their backlog through a substantial volume of municipal and utility contract business. Several additional round tonnages, some above 1000 tons, have been booked for early requirements from these sources. Nearly all the sales so far this year have been to Middle West and Pacific Coast points. Other large tonnages are pending from these districts. Several Southern cities are inquiring for their 1930 requirements. Shipments have increased some in the past two weeks, but are still lagging behind production. Prices are firm at \$37 to \$48 a net ton, Birmingham.

Old Material.—Dealers report an improvement in sentiment, but no trading of consequence except a few orders from the large steel mills. Quotations are the same and represent nominal values in most cases.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	\$13.00 to \$13.50
Scrap steel rails	14.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	11.50 to 12.00
Steel axles	22.00
Iron axles	23.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	15.50
No. 1 cast	13.00
Tramcar wheels	12.50
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem.	13.50 to 14.00

contracting, but price reductions since the first of the year have improved this situation slightly. The steel companies are now convinced that the absolute minimum in price structure has been reached, and that steel buyers who have been holding off on their contracts now realize that further postponement of buying would be to no avail. It is also generally conceded that the present price levels are too low to be profitable to the steel producers, and that advances may be expected as soon as steel demand reaches normal proportions, probably before the end of the present quarter.

Efforts are still being made to hold the bar price at 1.90c., Pittsburgh, but lower quotations in the Cleveland territory have been disturbing to this district, and the quotation has yet to meet adequate tests. On other steel products, producers have generally recognized quotations \$2 a ton under those which prevailed nominally at the beginning of the year. On anything except carload lots or less, strip makers are now willing to go to 1.80c. and 1.90c., Pittsburgh, for hot-rolled material and to 2.65c. on cold-rolled. Wide strip sold on the blue annealed sheet base is quotable at 2c. for the No. 10 gage, and 2.15c. for the No. 13. The blue annealed jobbing mill product ranges from 2.10c. to 2.20c. for the No. 10 gage, and 2.25c. to 2.35c. for the No. 13. Black sheets are now quotable at 2.65c. to 2.75c., although the latter figure has become less common in the last week. Mills are still quoting 3.40c., Pittsburgh, on galvanized sheets, although large jobbers are given concessions of \$2 a ton. On automobile body sheets the 3.90c., Pittsburgh, price is holding, while metal furniture sheets are unchanged at 4.00c.

The market on primary materials has maintained more strength than that on finished steel products, and semi-finished steel is still quotable at \$34, Pittsburgh or Youngstown. The sheet bar price is subject to considerable pressure on account of weakness in sheets, and a price of \$33 is reported to have been made in this district. Pig iron quotations are unchanged in a quiet market. Sales of basic iron are notably infrequent, and transactions in foundry material are mostly in small lots at \$18.50, Valley furnace. Malleable and Bessemer are quoted at \$19. The scrap market in this district is holding at recently advanced levels, but shows no tendency toward further increases at this time.

Youngstown

Sharp Increases in Production at Nearly All Valley Mills—Automobile Orders Largely Responsible

YOUNGSTOWN, Jan. 21.—The Valley steel industry has staged an impressive comeback since the beginning of the year. The beginning of the last half of January finds steel ingot operations at about 60 per cent of capacity, with finishing mills running at a somewhat better rate in some cases. The Youngstown Sheet & Tube Co. has put on an additional blast furnace. Sharp increases in production have been registered in nearly all departments. A possible exception is the pipe mills, which are still operating in a limited way, but are probably affected more by seasonal influences than the other departments.

Tonnage releases on automobile steel are responsible for a considerable part of the increased activity in the Valleys, but it is freely pointed out that specifications from this

source have by no means reached normal volume. The Ford Motor Co. is taking steel at a good rate, but the operations of most of the other motor car manufacturers are still held up to a considerable extent, and are not likely to come into full swing until the last of the important automobile shows have been held. Under such circumstances, really heavy shipments to Michigan companies are not expected to get under way until the middle of February. However, other steel consuming industries depending upon Youngstown district mills are increasing their requirements regularly, and in the opinion of some steel company executives a healthy diversification of demand is developing which can do much to maintain the steel industry on an even keel.

Hesitancy still exists among many large consumers regarding forward

Mining and industrial electric locomotives to the number of 825 were shipped in 1929, against 569 in 1928, according to reports received by the Department of Commerce from nine firms comprising practically the entire industry. The 1929 total was the largest since 1926, but was far below the 1923 shipments of some 1270 units.

Pacific Coast

January Improvement Chiefly in Structural Material and Cast Iron Pipe—Steel Prices Unchanged

SAN FRANCISCO, Jan. 18 (By Air Mail).—While there has been some improvement in demand for structural material and cast iron pipe since the first of the year, a widespread movement of steel products has not yet got under way. Important bookings included 400 tons of reinforcing steel for a club in Berkeley, Cal., placed with the Soule Steel Co. and 398 tons of plates for a hammer-welded pipe line at Los Angeles, secured by the Santa Fe Pipe & Supply Co.

Structural material here continues firm at 2.35c., c.i.f., though plate prices have been weak at 2.25c., c.i.f., for some time.

Pig Iron.—Sales and inquiries are in small lots. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—Bookings this week totaled upward of 600 tons. Two State highway projects in California involving 160 tons and 122 tons respectively were placed this week with unnamed interests. Bids have been opened on 838 tons for a bridge near Gold Beach, Ore., and on 137 tons for highway work in Imperial County, Cal. Merchant bar demand continues to be limited to unimportant lots. Prices on this class of material continue fairly firm at 2.35c., c.i.f. Out-of-stock prices on reinforcing steel bars remain at 2.30c., base, on carload lots and at 2.60c. on smaller quantities in the bay district.

Plates.—The only plate award of importance was for a hammerwelded pipe line at Los Angeles, mentioned above. Demand is extremely quiet, most bookings calling for lots of 20 to 60 tons. No action has yet been taken on 282 tons for a 22-in. pipe line at Omak, Wash., bids on which were opened last week.

Shapes.—Awards this week involved

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.30c.
Soft steel bars	3.30c.
Small angles, $\frac{1}{4}$ -in. and over	3.15c.
Small angles, under $\frac{1}{4}$ -in.	3.35c.
Small channels and tees, $\frac{1}{4}$ -in. to $2\frac{3}{4}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'd sheets (No. 10)	3.90c.
Galv. sheets (No. 24)	3.30c.
Struc. rivets, $\frac{1}{2}$ -in. and larger	5.65c.
Com. wire nails, base per kg.	\$2.40
Cement c't'd nails, 100 lb. keg	3.40

only one project in excess of 100 tons. An unnamed fabricator took 150 tons for a bridge at Newport Beach, Cal. Bids will be opened next week on 300 tons for an addition to the Southern

Pacific Co. Hospital, San Francisco, and bids were opened last week on 245 tons for a bridge over the Yellowstone River at Gardiner, Mont., Stevens Brothers being the low bidders.

Cast Iron Pipe.—While considerable cast iron pipe tonnage is pending, awards this week were confined to lots of less than 100 tons. Bids were opened this week on 3618 tons of 4 to 16-in. Class B or 150 pipe for the East Bay Municipal Utility District, Oakland, Cal. Lee R. Weber was low bidder on 426 tons of 2 to 8-in. Class 150 pipe for Villa Park, Santa Ana, Cal. The Santa Fe Irrigation District, Oceanside, Cal., will open bids on Jan. 21 for 383 tons of 12-in. Class B or steel pipe, and San Diego will open bids on Feb. 3 for 135 tons of 6 to 12-in. Class B pipe for Tamarack Street, Redlands, Cal., opened bids this week on 237 tons of 4 to 12-in. cast iron or steel pipe.

St. Louis

Foundry Pig Iron Order of 12,000 Tons Divided Between Northern and Southern Furnaces

ST. LOUIS, Jan. 21.—The principal transaction of the week was the sale of 12,000 tons of pig iron to a manufacturer of heating apparatus in the district for first quarter delivery, the order being divided about equally between Northern and Southern producers. It is estimated that an additional 3000 tons was sold to other melters. Plants closed for the holidays have all resumed operations, although the coldest weather since 1918 has hampered work in foundries and materially reduced the melt. Sales of Southern iron were reported to have been made at \$14 to \$14.50. Shipments by the St. Louis Gas & Coke Corporation thus far in January are ahead of those in the corresponding period in December.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$19.50 to \$20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.92 to 19.42
Northern malleable, deliv'd	22.16
Northern basic, deliv'd...	22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—The coldest weather St. Louis has experienced in 12 years has brought a heavy demand for heating coke.

Finished Steel.—A gradually improving demand is noted for such items as tin plate, tank plates and galvanized and blue annealed sheets. Prices on sheets show some weakness. Warehouse business has improved slightly since Jan. 1. Severely cold weather has affected all lines. The Granite City Steel Co. expects to resume full operations this week. No building projects of consequence are in sight in St. Louis.

Old Material.—A round tonnage of heavy melting steel was bought during the week by two of the consumers in the district from dealers who were long of the particular grades wanted. Both consumers and dealers are proceeding with caution, the latter accepting as little business as possible at present quotations. Because of extremely cold weather, receipts are almost negligible. Steel car axles are 50c. higher and No. 1 railroad cast is 50c. lower. Railroad lists include: Chicago, Burlington & Quincy, 5525 tons; Chicago, Milwaukee, St. Paul & Pacific, 1280 tons; St. Louis & Hannibal, 1567 tons; St. Louis-San Francisco, 1200 tons; International-Great Northern, 600 tons, and Pullman Co., St. Louis, 28 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	\$12.50 to \$13.00
No. 2 heavy melting or shoveling steel	11.75 to 12.25
No. 1 locomotive tires	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	13.50 to 14.00
Railroad springs	15.50 to 16.00
Bundled sheets	9.50 to 10.00
No. 2 railroad wrought	12.50 to 13.00
No. 1 busheling	9.75 to 10.25
Cast iron borings and shoveling turnings	9.25 to 9.75
Iron rails	13.00 to 13.50
Rails for rolling	14.50 to 15.00
Machine shop turnings	6.75 to 7.25
Heavy turnings	9.50 to 10.00
Steel car axles	18.50 to 19.00
Iron car axles	25.50 to 26.00
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought	13.00 to 13.50
Steel rails, less than 3 ft.	17.00 to 17.50
Steel angle bars	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
No. 1 machin'ry cast	15.25 to 15.75
Railroad malleable	14.00 to 14.50
No. 1 railroad cast	14.00 to 14.50
Stove plate	11.75 to 12.25
Relay. rails 60 lb. and under	20.50 to 23.50
Relay. rails 70 lb. and over	26.50 to 29.00
Agricul. malleable	14.00 to 14.50

Buffalo

Pig Iron Melt Increasing and Orders Also Gain—Week's Business 10,000 to 12,000 Tons

BUFFALO, Jan. 21.—The recent reduction in the district pig iron price resulted in considerable quiet covering, though much iron is still to be placed for the first quarter. The melt thus far in January shows a substantial gain, and the buying is apparently being done with confidence. The General Electric Co. is understood to have covered its recent inquiry for 4000 tons. A New England manufacturer of textile machinery is reported to have placed 1000 tons of foundry, and there have been several 400 and 500-ton lots sold, as well as a few other 1000-ton lots. Some sizable malleable business is due to be placed within a week or so, though this may not appear in inquiry form. Estimated total tonnage placed in this district during the past week is 10,000 to 12,000 tons.

Prices per gross ton, f.o.b. furnace:

No. 2 fdv., sil. 1.75 to 2.25	\$18.50
No. 2X fdv., sil. 2.25 to 2.75	19.00
No. 1 fdv., sil. 2.75 to 3.25	20.00
Malleable, sil. up to 2.25	19.00
Basic	17.00
Lake Superior charcoal	27.28

Finished Steel.—Operations of mills in this district have lessened slightly. Bethlehem's Lackawanna plant reduced operations to 16 open-hearths, with the sheet bar and plate mills down entirely for two days of the week. The Donner Steel Co. is operating three open-hearths, which may be stepped up to five during the week. The Wickwire-Spencer plant is operating at 50 per cent, and the Seneca Iron & Steel Co. at 65 per cent. Bolt business is considerably improved; the Buffalo Bolt Co. is operating between 50 and 60 per cent. Fabricated structural business is quiet. An arch bridge over the Genesee River at

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blow ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$3.25
Black wire, base per 100 lb.	3.45

Rochester will require 2000 tons of reinforcing bars.

Old Material.—The market is quiet. A mill which recently purchased about 4000 tons of No. 1 heavy melting steel and No. 1 busheling has relaxed a little on shipping directions, but has not entirely removed its suspension. There have been a few specialty sales of knuckles and couplers and rolled steel wheels at \$18.50, but most of this material is going to Pittsburgh, Alliance and other points. There has been a little strengthen-

ing in the market for machine shop turnings and shoveling steel turnings because of lessened production.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$14.00 to \$14.50
No. 2 heavy melting scrap	12.50
Scrap rails	13.50 to 14.50
Hydraul. comp. sheets	12.50
Hand bundled sheets	10.50 to 11.00
Drop forge flashings	12.50
No. 1 busheling	13.00 to 13.50
Hvy. steel axle turnings	13.00 to 13.50
Machine shop turnings	8.50 to 9.50
No. 1 railroad wrought	10.50 to 11.00

Acid Open-Hearth Grades:	
Knuckles and couplers	18.00 to 18.50
Coil and leaf springs	18.00 to 18.50
Rolled steel wheels	18.00 to 18.50
Low phos. billet and bloom ends	18.00 to 18.50

Electric Furnace Grades:	
Short shov. steel turnings	12.50 to 13.00

Blast Furnace Grades:	
Short mixed borings and turnings	10.75 to 11.25
Cast iron borings	10.75 to 11.25
No. 2 busheling	8.00

Rolling Mill Grades:	
Steel car axles	16.50 to 17.00
Iron axles	20.00 to 21.00

Cupola Grades:	
No. 1 machinery cast	14.50 to 15.00
Stove plate	12.50
Locomotive grate bars	10.00 to 10.50
Steel rails, 3 ft. and under	17.75 to 18.25
Cast iron carwheels	11.50 to 12.00

Malleable Grades:	
Industrial	16.50 to 17.00
Railroad	16.50 to 17.00
Agricultural	16.50 to 17.00

Special Grades:	
Chemical borings	12.00 to 12.50

Boston

Pig Iron Sales Increase, Prices Weaker—Cast Iron Pipe Demand Promising—Scrap Tone Stronger

BOSTON, Jan. 21.—Pig iron sales during the past week, at about 7000 tons, were the largest for any similar period since the third quarter of last year. The Draper Corporation divided 3000 tons of foundry iron, silicon 2.25 to 2.50 per cent, among three producers: a Connecticut melter took 1500 tons, divided between two furnaces; the Sullivan Machinery Co., Claremont, N. H., gave a total of 300 tons to two furnaces. Numerous lots ranging from a carload to 500 tons also were sold. Quotations by Buffalo furnaces are usually \$17, furnace, but this price has been shaded. Other New York State sellers and the local furnace are meeting Buffalo delivered prices. No. 2 X iron, made by a furnace east of the Buffalo district, has been sold at \$20.50, delivered. Several sizable lots of pig iron are under negotiation. Foundries are beginning to obtain some good business, and the New England melt is increasing.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	\$21.90 to \$22.41
*Buffalo, sil. 2.25 to 2.75	21.90 to 22.41
East. Penn., sil. 1.75 to 2.25	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75	23.15 to 23.65
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	24.11
*Ala., sil. 2.25 to 2.75	24.61
*Ala., sil. 1.75 to 2.25	20.25
*Ala., sil. 2.25 to 2.75	20.75

Freight rates: \$4.91 all rail from Buffalo; \$3.65 all rail from eastern Pennsylvania; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe.—Two miles of 6-in. pipe has been placed privately. The Boston Consolidated Gas Co. this month will buy 7000 tons of 6 to 16-in. gas pipe, and another utility company 2000 tons for first half requirements. Fall River, Mass., closes bids Jan. 23 on 600 tons of 6 to 16-in. pipe, and Providence, R. I., this week will purchase a round tonnage. Southboro, Mass., and Marlboro, N. H., probably will purchase supplies for water systems this quarter, and a Dover, N. H., country club expects to buy 6000 ft. of 6-in. pipe. Indications are that sales of pipe in New England the first half of this year will break all recent records. Prices quoted openly on carloads of domestic pipe are: 4-in., \$44.10 to \$45.10 a ton, delivered common Boston freight rate points; 6-in. and larger, \$42.10 to \$43.10, or an average advance of \$1 a ton on inside quotations. A \$4 differential is asked on Class A and gas pipe.

Old Material.—The movement of scrap is increasing, but is by no means active. During the past week sales included 24 narrow gage locomotives, weighing approximately 1000 tons, to a Pennsylvania scrap yard; round tonnages of No. 1 heavy melting steel and bundled skeleton to the Pittsburgh territory and to Worcester, Mass.; and smaller lots of scrap rails, steel turnings, steel mill borings and mixed borings and turnings to Pennsylvania points. Heavy melting steel

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
Per Cent Off List	
Machine bolts	.50 and 5
Carriage bolts	.50 and 5
Lag screws	.50 and 5
Hot-pressed nuts	.50 and 5
Cold-punched nuts	.50 and 5
Stove bolts	.70 and 10

*Including quantity differentials.

and pipe are about 50c. a ton higher. New England foundries are taking textile and machinery cast a little more freely. Except for the shipment of 1000 tons of scrap to Japan, the export market is stagnant. There is some talk of two lots of scrap being shipped next month to Norway. Danzig appears to have ceased importing material for the present.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$10.50 to \$11.00
Scrap T rails	10.00 to 10.25
Scrap girder rails	9.00 to 9.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Machine shop turnings	6.10 to 6.50
Cast iron borings (steel works and rolling mill)	6.00 to 6.50
Bundled skeleton, long	8.25 to 8.75
Forge flashings	8.50 to 9.00
Blast furnace borings and turnings	5.75 to 6.25
Forge scrap	8.00 to 8.50
Shafting	14.00 to 14.50
Steel car axles	15.50 to 16.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	9.00 to 9.50
Rails for rolling	10.50 to 11.00
Cast iron borings, chemical yards:	9.00 to 9.50
Textile cast	\$14.00 to \$14.50
No. 1 machinery cast	15.00 to 15.25
No. 2 machinery cast	14.00 to 14.50
Stove plate	10.00 to 11.00
Railroad malleable	17.00 to 17.50

Detroit Scrap Weaker

DETROIT, Jan. 21.—A note of weakness has developed in the scrap market during the past week, due to the fact that there have been several hold-ups by steel plants. While prices have not changed, the small sales being made are at the low side of the range. Dealers feel that this is only a temporary situation.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$12.50 to \$13.00
Borings and short turnings	9.25 to 9.75
Long turnings	8.50 to 9.00
No. 1 machinery cast	12.50 to 13.00
Automotive cast	11.50 to 12.00
Hydraul. comp. sheets	12.50 to 13.00
Stove plate	9.00 to 9.50
New No. 1 busheling	11.50 to 12.00
Old No. 1 busheling	9.25
Sheet clippings	8.00 to 8.50
Flashings	10.75 to 11.25

The Concrete Reinforcing Steel Institute will hold its sixth annual meeting at the Bon-Air Vanderbilt, Augusta, Ga., March 31 to April 2, inclusive.

Warehouse Prices, f.o.b. Cincinnati

Base per Lb.

Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinfrc. bars	3.15c.
Rail steel reinfrc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	\$3.00
Com. wire nails, base per keg	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain, per 100 lb.	8.75
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.	\$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

Cincinnati

Pig Iron Consumers, with Low Stocks, Place Larger Orders—Sheet Demand Takes a Sharp Spurt

CINCINNATI, Jan. 21.—With their supplies of pig iron running low, district consumers came into the market in the past week for a total of 7250 tons of iron for first quarter. While this is a sharp increase in sales over the preceding week, an analysis of the individual orders indicates that buyers are cautious and not closing for their customary quantities. In fact, no buyer took more than 50 per cent of usual requirements. Two southern Ohio melters bought 1000 tons each of Northern foundry iron, a central Indiana buyer took 200 tons and a Fort Wayne, Ind., consumer took 500 tons. Southern furnace representatives accounted for about 1500 tons of iron in scattered lots of one or two cars. Prices on these sales ranged from \$14 to \$14.50, base Birmingham. Except for an inquiry from a central Indiana melter for 500 tons of Northern and 500 tons of Southern foundry, there are no sizable inquiries.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$19.89 to \$20.39
Ala. fdy., sil. 1.75 to 2.25	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—Demand for sheets has increased sharply. A feature of the market is the large number of emergency calls, consumers

placing orders wherever they can obtain the earliest delivery. Beginning Feb. 1, activity on the new building being constructed here by the Starnet corporation will be increased, and contracts calling for delivery of 1500 tons of structural steel a week will be placed, it was announced here today.

Coke.—Shipments of by-product foundry coke on contract are steadily improving this month. Prices continue at about \$10.05, delivered Cincinnati.

Old Material.—District scrap dealers are buying cautiously. As a result of a scarcity of good scrap, dealers were forced last week to bid 25c. higher on heavy melting steel and No. 2 railroad wrought. Mills are accepting shipments on old contracts, and tonnages previously held up have been released. New business is slow.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	\$12.50 to \$13.00
Scrap rails for melting	13.00 to 13.50
Loose sheet clippings	8.00 to 8.50
Bundled sheets	10.75 to 11.25
Cast iron borings	8.50 to 9.00
Machine shop turnings	8.25 to 8.75
No. 1 busheling	10.00 to 10.50
No. 2 busheling	6.50 to 7.00
Rails for rolling	13.50 to 14.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	12.50 to 13.00
Short rails	17.50 to 18.00
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast	18.50 to 19.00
No. 1 railroad cast	15.00 to 15.50
Burnt cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Brake shoes	10.00 to 10.50
Agricultural malleable	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Canada

Pig Iron Affected by Decline at Buffalo

TORONTO, ONT., Jan. 21.—Following the recent reduction of \$1 a ton in prices of pig iron at Buffalo, Canadian pig iron consumers have adopted a waiting attitude, evidently in the expectation that Dominion producers will reduce prices. No such action has yet been taken, and current orders for small lots are being taken at \$23.60, Toronto, for No. 1 iron. Some of the Canadian users who regularly contract for their quarterly requirements are covered up to the end of March. Spot buying has been in fair volume recently at about 1500 tons a week.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$23.60
No. 2 fdy., sil. 1.75 to 2.25	23.10
Malleable	23.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$25.00
No. 2 fdy., sil. 1.75 to 2.25	24.50
Malleable	25.00
Basic	23.50

Imported Iron, Montreal Warehouse	
Summerlee	\$33.50
Carson	33.00

Old Material.—The uncertainty that exists in the pig iron market regarding prices is having some effect on business in this market. Consumers are buying sparingly. Local dealers are still paying the prices which are quoted below.

Dealers' buying prices:

Per Gross Ton	Montreal
Heavy melting steel	\$8.50
Rails, scrap	9.00
No. 1 wrought	12.00
Machine shop turnings	7.50
Boiler plate	6.00
Heavy axle turnings	7.50
Cast borings	5.00
Steel borings	6.50
Wrought pipe	6.00
Steel axles	15.00
Axles, wrought iron	22.00
No. 1 mach'y cast	17.00
Stove plate	13.00
Standard carwheels	16.00
Malleable	13.00

Per Net Ton

No. 1 mach'y cast	\$16.00
Stove plate	12.00
Standard carwheels	15.00
Malleable scrap	14.00

Kay-Brunner Steel Castings Co. and Kay Steel Wheel Co., both of Los Angeles, Cal., have been consolidated as Kay-Brunner Steel Products Co., with general offices at 2721 Elm Street, that city. Company will produce steel wheels, steel castings and "Electro-Art" architectural steel.

Fabricated Structural Steel

Awards of Nearly 25,000 Tons Include 8000 Tons for Brooklyn Telephone Building

STRUCTURAL steel awards in the week, as reported to THE IRON AGE, totaled nearly 25,000 tons, as compared with 27,000 tons in the preceding week. The largest contract was 8000 tons for a telephone building in Brooklyn. A viaduct in Philadelphia takes 2400 tons. New projects were light at about 10,500 tons, but included three projects of good size: 2500 tons for a telephone building in Boston, 2200 tons for a hotel at Akron, Ohio, and 2000 tons for a highway bridge in Newark, N. J. Awards follow:

BOSTON & MAINE RAILROAD, 250 tons, bridge at Johnsonville, N. Y., to Shoemaker Bridge Co.

NEW YORK, 1500 tons, apartment building, 360 West Seventy-second Street, to Taylor-Fichter Steel Construction Co.

NEW YORK, 1700 tons, public schools, Nos. 97 in Bronx and 176 in Brooklyn, 400 tons each, to Easton Structural Steel Co., and No. 155 at Ozone Park, L. I., 900 tons, to Hinkle Iron Works.

NEW YORK, 250 tons, physics laboratory at Fordham University, to Reliance Iron Works, Brooklyn.

NEW YORK, 300 tons, slaughter house on West Fortieth Street, to unnamed fabricator.

NEW YORK, 800 tons, Polyclinic Hospital, to Fred T. Ley Co.

BROOKLYN, 8000 tons, Willoughby Street telephone exchange, to Hay Foundry & Iron Works.

JERSEY CITY, N. J., 300 tons, slaughter house for Pennsylvania Railroad, to Bethlehem Fabricators, Inc.

PHILADELPHIA, 2400 tons, Arch Street viaduct, to McClintic-Marshall Co.

WASHINGTON, 500 tons, Shakespeare Library, to Shoemaker Bridge Co.

PENSACOLA, FLA., 500 tons, chemical mill for Armstrong-Newport Co., to Worden-Allen Co.

PITTSBURGH, 1500 tons, 10 barges for Iron City Sand Co.; five to Dravo Contracting Co. and five to Riter-Conley division, McClintic-Marshall Co.

BATON ROUGE, LA., 560 tons, building for Standard Oil Co., to Ingalls Iron Works.

NICKEL PLATE RAILROAD, 230 tons, bridge at Caffein, Ill., to American Bridge Co.

DETROIT, 250 tons, plant for Michigan Tool Co., to Austin Co.

AKRON, OHIO, 900 tons, Young Women's Christian Association building, to Berger Iron Works.

RACINE, WIS., 300 tons, school, to a Milwaukee fabricator.

KANSAS CITY, Mo., 1350 tons, toll building for Southwestern Bell Telephone Co., to American Bridge Co.

KANSAS CITY, Mo., 300 tons, bus terminal, to Kansas City Structural Steel Co.

HOT SPRINGS, ARK., 625 tons, Arkansas Power & Light Co., to Virginia Bridge & Iron Co.

ROCK ISLAND RAILROAD, 400 tons, bridges in Oklahoma.

WELEETKA, OKLA., 500 tons, power plant, to Patterson Steel Co., Tulsa, Okla.

SAN FRANCISCO, 150 tons, garage, Franklin and Bush Streets, to Dyer Brothers.

LOS ANGELES, 398 tons, plates, 36 and 40-in. pipe, to Santa Fe Pipe & Supply Co.

NEWPORT BEACH, CAL., 150 tons, bridge on Lido Island, to an unnamed fabricator.

LONG BEACH, CAL., 350 tons, building for Long Beach Sun, to McClintic-Marshall Co. and not to Consolidated Steel Corporation, as reported last week.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

BOSTON, 2500 tons, telephone exchange.

Reinforcing Steel

Awards Light at 3000 Tons—New Work Totals 9500 Tons

REINFORCING steel lettings reported the past week were mostly in small tonnages, which totaled about 3000 tons. The largest, 1000 tons, was for an Ohio River boulevard near Millvale, Pa. Pending work of 9500 tons includes two 2000-ton jobs and 2500 tons for a sea wall at Port Arthur, Tex. Awards follow:

NEW YORK, 125 tons, foundation for triborough bridge, to McClintic-Marshall Co.

PORT OF NEWARK, 100 tons, Westinghouse Electric & Mfg. Co. plant, to McClintic-Marshall Co.

KEARNY, N. J., 125 tons, west approach to Hackensack River bridge, to McClintic-Marshall Co.

STATE OF PENNSYLVANIA, 1000 tons, Ohio River Boulevard near Millvale, Pa., to McClintic-Marshall Co.

CLEVELAND, 300 tons, Fairmount creamery, to Bourne-Fuller Co.

ASHTABULA, OHIO, 500 tons, substructure for Cleveland Electric Illuminating Co., to Bourne-Fuller Co.

CHICAGO, 130 tons, substation on North Dearborn Street for Commonwealth Edison Co., to Calumet Steel Co.

SACRAMENTO, 160 tons, highway work in San Mateo County, to unnamed bidder.

SACRAMENTO, 122 tons, highway work in Santa Clara County, to unnamed bidder.

BERKELEY, CAL., 400 tons, Women's Club, to Soule Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

KEARNY, N. J., 2000 tons, buildings for Western Electric Co.

PHILADELPHIA, 900 tons, Ridge Avenue subway.

ROCHESTER, N. Y., 2000 tons, Ridge Road bridge.

HAMPTON, VA., unstated tonnage, wind tunnel and seaplane channel for Langley Field.

PITTSBURGH, 900 tons, bridge and road work for Allegheny County.

AKRON, OHIO, 140 tons, East Thornton Street grade elimination viaduct.

CLEVELAND, 235 tons, two piers for Lorain-Central bridge.

PORT ARTHUR, TEX., 2500 tons, sea wall.

CHICAGO, 600 tons, warehouse for Commonwealth Edison Co.

CHICAGO, 175 tons, hospital for University of Chicago.

Casting steel slabs centrifugally was demonstrated at the Canton, Ohio, works of the Central Alloy Steel Corporation, Jan. 16. The machine, designed by Leon Cammen, New York, had a revolving element 7 ft. in diameter. Radial separators around the periphery inside provide for making the curved slabs, which may then be rolled in more or less the usual manner. The invention is, of course, planned to displace the casting of ingots and the subsequent breaking down of the ingots in a blooming mill.

Non-Ferrous Metal Markets

Copper Dull But Firm—Tin Active—Lead Quiet and Steady—Zinc Stronger

NEW YORK, Jan. 21.

Copper.—Buying of copper is confined to domestic consumers' immediate needs, which are not large. Current buying is for very early delivery, and not much February copper is booked. Consumers seem to be sure that, because of large stocks of refined metal, there is no danger of a shortage and that their needs can be filled promptly. There is, of course, no prospect of an advance in price and, according to producers, there is no likelihood of a reduction. It is a buyer's market, and consumers are letting the producers carry the cost of maintaining stocks. After the December statistics were made public last week, the Anaconda Copper Mining Co. announced further curtailment of mining operations, and it is understood that other companies have taken, or are about to take, similar steps. Information coming to producers is to the effect that automobile companies are increasing operations and ordering both copper and brass, and that the wire and cable companies are about to cover their copper needs. Producers state that they know of considerable business in prospect which must be placed before long, and that indications point to some substantial buying in the near future. Prices continue firm and unchanged at 18c. for electrolytic copper, delivered in the Connecticut Valley, and at 18.30c. c.i.f. usual European ports, for export. Export business is considerably better than in December and sales thus far this month, at about 22,000 tons, are larger than for all of December. Business in Lake copper during January has been about 80 per cent of the production of one company and is the largest business since fall. Prices are firm and steady at 18c. to 18.12½c., delivered.

Tin.—Spot Straits tin was sold today at 37.75c. a lb., New York, the lowest level since July 5, 1923. In November the market dipped to the lowest prices since August of the same year. After several weeks of inactivity, buying of tin has been quite brisk, due to falling values. Sales on three days in the past week totaled more than 1000 tons, practically all taken by consumers. On Friday, Jan. 17, the most active day, 500 tons changed hands, involving all positions from spot to July and August. On the following day 200 tons changed

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Jan. 21	Jan. 20	Jan. 18	Jan. 17	Jan. 16	Jan. 15
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*.....	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.....	37.75	38.25	38.37½	38.50	38.87½	38.75
Zinc, East St. Louis.....	5.15	5.10	5.05	5.10	5.10	5.15
Zinc, New York.....	5.50	5.45	5.40	5.45	5.45	5.50
Lead, St. Louis.....	6.10	6.10	6.10	6.10	6.10	6.10
Lead, New York.....	6.25	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products. Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—

High brass.....	23.25c.
Copper, hot rolled.....	26.75c.
Zinc.....	10.50c.
Lead (full sheets).....	10.00c.

Seamless Tubes—

High brass.....	28.25c.
Copper.....	29.25c.

Rods—

High brass.....	21.25c.
Naval brass.....	24.00c.

Wire—

Copper.....	19.87½c.
High brass.....	23.75c.
Copper in Rolls.....	26.75c.

Brazed Brass Tubing.....

30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide.....	33.00c.
Tubes, base.....	42.00c.
Machine rods.....	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

	Base per Lb.
High brass.....	23.25c.
Copper, hot rolled.....	27.75c.
Copper, cold rolled, 14 oz. and heavier.....	30.00c.
Zinc.....	10.75c.
Lead, wide.....	10.30c.

Seamless Tubes—

Brass.....	28.25c.
Copper.....	29.25c.

Brass Rods.....

21.25c.

Brazed Brass Tubes.....

31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes.....	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	30.00c. to 31.00c.
Brass.....	26.00c. to 27.00c.
Copper.....	29.12½c. to 30.12½c.
Brass Rods.....	18.87½c. to 19.87½c.
Brazed Brass Tubes.....	29.12½c. to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	10.75c. to 11.25c.
Zinc sheets, open.....	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	40.50c. to 41.50c.
Tin, bar.....	42.50c. to 43.50c.
Copper, Lake.....	19.50c.
Copper, electrolytic.....	19.25c.
Copper, casting.....	19.00c.
Zinc, slab.....	6.50c. to 7.50c.
Lead, American pig.....	7.00c. to 7.50c.
Lead, bar.....	9.00c. to 9.50c.
Antimony, Asiatic.....	10.50c. to 11.00c.
Aluminiun No. 1 Ingots for remelting (guaranteed over 99% pure).....	25.00c. to 26.00c.
Alum. Ingots, No. 12 alloy.....	24.00c. to 25.00c.
Babbitt metal, commercial grade.....	25.00c. to 35.00c.
Solder, ½ and ¾.....	27.00c. to 28.00c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	43.50c.
Tin, bar.....	45.50c.
Copper, Lake.....	19.50c.
Copper, electrolytic.....	19.25c.
Copper, casting.....	18.75c.
Zinc, slab.....	7.75c. to 8.00c.
Lead, American pig.....	7.00c. to 7.20c.
Lead, bar.....	9.25c.
Antimony, Asiatic.....	16.00c.
Babbitt metal, medium grade.....	18.00c.
Babbitt metal, high grade.....	46.50c.
Solder, ½ and ¾.....	28.25c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

Dealers' Buying Prices

Dealers' Selling Prices

Copper, hvy. crucible.....	14.75c.	16.25c.
Copper, hvy. and wire.....	14.50c.	16.00c.
Copper, light and bottoms.....	12.50c.	13.75c.
Brass, heavy.....	8.00c.	9.25c.
Brass, light.....	6.75c.	7.75c.
Hvy. machine composition.....	11.25c.	12.25c.
No. 1 yel. brass turnings.....	9.00c.	9.50c.
No. 1 red brass or compositions, turnings.....	10.50c.	11.75c.
Lead, heavy.....	4.75c.	5.25c.
Lead, tea.....	3.75c.	4.25c.
Zinc.....	3.00c.	3.50c.
Sheet aluminum.....	11.00c.	12.00c.
Cast aluminum.....	10.00c.	12.00c.

hands, mostly nearby delivery, with some April involved. Yesterday, Jan. 20, 350 tons was sold, of which at least 100 was for spot and January delivery, with the rest futures. With the London market weak and with prices at low levels, consumers evidently have become convinced that conditions are favorable to replenishing stocks. London prices today were about £2 per ton lower than a week ago, with spot standard quoted at £172 5s., future standard at £175 5s., and spot Straits at £174. The Singapore price today is £178. The lower values are due largely to mounting stocks. As to London reports of curtailment of output, no definite announcement has been made. Today in New York the market was moderately active.

Lead.—Conditions have changed little during the week. The market is only moderately active, demand being confined to January and early February delivery. Practically no business has been booked for March except in a few cases. In the outside market, prices continue firm at 6.10c., St. Louis, with the quotation of the leading interest unchanged at 6.25c., its contract price.

Zinc.—Demand has increased and prices are higher, following a period of weakness. A report became current that a fairly large block was sold for cash at 5c., East St. Louis. This started consumers to make inquiries and considerable buying resulted, but reliable opinion is to the effect that very little metal, outside of the case referred to, changed hands at less than 5.05c. to 5.10c., East St. Louis. Considerable demand was satisfied around 5.10c., and since then the market has advanced, until today prime Western slab zinc is held firmly at 5.15c. to 5.20c., with a limited amount available at the lower level. These prices involve delivery during the first quarter. Ore prices are unchanged at \$35, Joplin, with production at a low point last week, the total having been only about 5500 tons. Sales were higher than in the previous week at 9230 tons, and shipments were more than 8500 tons, leaving the surplus at approximately 28,000 tons, the smallest since last April.

Antimony.—Due to the advance in silver and its effect on exchange, prices of Chinese metal for spot delivery are higher, at 8.75c., New York, duty paid, with futures at 8.25c.

Nickel.—Ingot nickel in wholesale lots is quoted at 35c. a lb., with shot nickel, 36c., and electrolytic nickel in cathodes at 35c.

Aluminum.—The quotation of virgin metal, 98 to 99 per cent pure, continues at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Jan. 21.—Prices for copper and lead are holding in a market which is unusually spotty. Quotations on tin and zinc are lower while prices for antimony are higher. The old metal market is quiet.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 39.37½c.; lead 6.20c.; zinc, 5.25c.; in less-than-carload lots, antimony, 10c. On old metals we quote copper wire crucible shapes and copper clips, 14c.; copper

bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Leaders Selected for Special Sessions

Foundrymen Announce Round-Table Discussion Chairmen —Managers and Topics for Shop-Operation Courses

GREATER interest shown by an increasing attendance at the round-table meetings and shop-operation courses, which formed a part of the past few conventions of the American Foundrymen's Association, has led the program committee to broaden the scope of these sessions for the 1930 annual meeting. The program for this year's convention, scheduled for the week of May 12 at Cleveland, provides for three round-table luncheon meetings, covering malleable, steel and non-ferrous foundry practice.

Chairmen selected to lead these meetings are well-known leaders in their respective branches of the industry. H. M. St. John, metallurgist for the Detroit Lubricator Co., Detroit, will preside at the non-ferrous meeting. W. J. Corbett, Fort Pitt Steel Castings Co., McKeesport, Pa., will lead the steel group, and P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill., will act as chairman for the malleable group.

Three shop-operation courses, organized expressly for the practical shopman, are scheduled. These will cover steel foundry, gray iron and non-ferrous foundry practice. Each course will consist of a series of three or four sessions, the leaders for each session being assigned a definite subject for discussion.

Thus, W. F. Graham of the technical division, Ohio Brass Co., Mansfield, Ohio, is in charge of the course for the non-ferrous foundrymen. The subjects which will be discussed include crucible, open-fire and electric furnace practice. D. E. Broggi, foundry superintendent and metallurgist, Neptune Meter Co., Long Island City, N. Y., will lead the discussion on the indirect arc type furnace, and C. H. Morken, plant metallurgist, Ohio Brass Co., Mansfield, Ohio, will lead the discussion on the induction type furnace.

The steel foundry course is being organized by a committee consisting of John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.; F. J. Stanley, works manager, Michigan Steel Castings Co., Detroit, and C. D. Carey, works manager, American Steel Foundries, Verona, Pa. Sessions outlined for the steel course will cover chipping, grinding and riser removal; heat treating and heat-treating equipment, and core practice—including anchoring, rodding, venting and sand mixtures.

Four sessions will comprise the gray iron shop-operation course. The first will cover cupola materials and

will be under the direction of C. J. Scullin, Tucker-Scullin, Inc., St. Louis. Mr. Scullin will be assisted by E. J. Lowry, consulting metallurgist of Detroit.

Cupola materials and operation will be discussed at the second session, under leadership of R. S. MacPherran, chief chemist, Allis-Chalmers Mfg. Co., Milwaukee. He will be assisted by F. J. Walls, metallurgist, Wilson Foundry & Machine Co., Pontiac, Mich., and by James T. MacKenzie, metallurgist, American Cast Iron Pipe Co., Birmingham.

The third session will be devoted to a discussion of gating and risering, and will be led by H. W. Dietert, foundry engineer, United States Radiator Corporation, Detroit.

Those attending the fourth session will deal with high-test irons, alloy additions and heat treatment of cast iron. Leading this session will be H. Bornstein, metallurgist, Deere & Co., Moline, Ill., who will be assisted by F. B. Coyle, research metallurgist, International Nickel Co., New York.

In addition to these round-table meetings and shop-operation course sessions, the usual sessions covering technical and managerial phases of the foundry industry will be held.

December Non-Ferrous Ingot Deliveries

CHICAGO, Jan. 20.—The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for December, 1929, amounted to 5167 tons.

Open Lectures on Progress in Iron, Steel and Alloys

A series of special lectures is being given by the department of mining engineering, Columbia University covering the recent progress in metal mining and smelting. Of special interest will be one by Charles P. Perin, of Perin & Marshall, consulting engineers, New York, on "Progress in Ferrous Metallurgy" to be delivered at 5 p. m. Monday, Feb. 3. On Monday, Feb. 10, at 5 p. m., Dr. John A. Mathews, vice-president, Crucible Steel Co. of America, will talk on "The Age of Alloys," in which he will recount the recent progress in alloy steels. Both lectures are open to the public, and will be held in room 306, School of Mines, 116th Street and Broadway, New York.

PERSONAL

D. S. KERR has been placed in charge of the newly-established Chattanooga, Tenn., office of the Allis-Chalmers Mfg. Co., and it will be operated as a branch of the Atlanta district office, which is under the direction of BERRIEN MOORE.

STUART M. CROCKER, who resigned as vice-president of the United Electric Securities Co., to become assistant to the president of the International General Electric Co., has been elected a vice-president of the company. He was assistant to OWEN D. YOUNG, chairman of the board, General Electric Co., previous to his position with the securities company.

P. P. EVANS, for the past 30 years with the Osborn Engineering Co., Cleveland, has been made president of the company. E. H. BIRNEY, formerly president of the Peerless Drawn Steel Co., Massillon, Ohio, has become vice-president.

E. F. WENDT, formerly vice-president of the Buffalo Steam Pump Co., Buffalo, has been elected president of the company, and H. W. WENDT, JR., has become vice-president.

H. K. PORTER, who has been associated with the Hyatt Roller Bearing Co., Newark, N. J., for the past 14 years, has been appointed general sales manager, succeeding H. O. K. MEISTER, who has been promoted to assistant general manager.

J. V. SANTRY, formerly president of the Combustion Engineering Corporation, New York, has been appointed president, to succeed COL. H. D. SAVAGE, who is assisting the receivers.

C. C. OSTERHOUT, heretofore manager of sales of the Rome Iron Mills, Rome, N. Y., has been appointed manager of sales of the Rome division of the Wrought Iron Co. of America, with headquarters at Lebanon, Pa.

T. H. DRISCOLL, of the Chicago office of the Gardner-Denver Co., Quincy, Ill., has been transferred to the Los Angeles branch. FRED V. MOORE, who has been covering the eastern States, has been transferred to Phoenix, Ariz. R. J. FEATHERSTONE has been assigned to the New York office. IAN DUNCAN, of Edinburgh, Scotland, after a preliminary training in the American plants of the company, will represent the entire line in the London office of Gardner-Denver Co., Ltd.

E. R. ELAM has been appointed branch manager of the Minneapolis office of the Wagner Electric Co., to succeed L. J. DICIANNE, who has been

made branch manager of the Kansas City office.

JAMES F. DONAHUE, who has been elected president of the Lamson and Sessions Co., an Ohio corporation which has been formed as a subsidiary



J. F. DONAHUE

of the Lamson & Sessions Co., Cleveland, has been affiliated with the bolt and nut industry for about 35 years. He was born and raised in Pittsburgh and entered the employ of the Oliver Iron & Steel Co. of that city in 1895, working in various capacities until 1903, when he became secretary and sales manager of the New Castle Forge & Bolt Co. In 1908 he became Western sales manager for the Russell, Burdsall & Ward Bolt & Nut Co., with headquarters in Chicago. He became affiliated with the Foster Bolt & Nut Co. in Cleveland in 1920 as vice-president and general manager and a year ago was elected president and general manager. Upon the recent consolidation of the Foster Bolt & Nut Co., having plants in Cleveland and Chicago, with the Lamson & Sessions Co., the separate company was formed to manage the Chicago plant and look after Western operations. Mr. Donahue will have headquarters in the Straus Building, Chicago.

H. W. REYNOLDS has been made direct factory representative for northern Ohio, with headquarters at 1724 St. Clair Avenue, Cleveland, for the Taft-Pierce Mfg. Co., Woonsocket, R. I.

J. A. SUCCOP, research engineer, Heppenstall Forge & Knife Co., Pittsburgh, on Jan. 17 addressed the St. Louis chapter of the American Society for Steel Treating on the "Manufacture and Fabrication of Steel in a Modern Forge Shop."

ROBERT T. FRISBIE, vice-president, New Britain Machine Co., has been made a director of the City National Bank of New Britain, Conn.

J. S. VANICK, research department, International Nickel Co., read a paper on "High-Strength Cast Irons" before a meeting of the Southern Tier chapter of the American Society for Steel Treating, held Jan. 20 at Athens, Pa.

WILLIAM A. ROSENBERG, president of the Rosenberg Elevator Co., Milwaukee, was elected president of the Builders' Exchange of Milwaukee. All others elected at the annual meeting were in the metal or associated trades and include EDWARD HOFFMANN, Louis Hoffmann Co., manufacturer of sheet-metal work, secretary; T. J. BAKER, Coddington Engineering Co., vice-president; ARTHUR HENNECKE, C. Hennecke Co., structural steel and ornamental iron, re-elected treasurer.

LUCIUS M. KNOUSE, president, Stanley Electric Tool Co., has been made a director of the Savings Bank of New Britain, Conn.

RALPH LEAVENWORTH has been appointed a member of the sales department of the Austin Co., Cleveland, and will act as assistant to GEORGE A. BRYANT, JR., executive vice-president. Mr. Leavenworth had been secretary and account executive of Paul Teas, Inc., advertising agency, Cleveland, and is vice-president of the Cleveland Advertising Club.

CLARENCE J. KENNEDY has been promoted to plant engineer of the Gary, Ind., unit of the American Bridge Co., succeeding FREDERICK DENCER, who has been made assistant engineer of the western division with headquarters in Chicago. Mr. Kennedy was graduated from Highland Park College, Des Moines, Iowa. He has been attached to the Gary plant of the American Bridge Co. in 1912.

GEORGE H. PALM, for the past six years engineer with the Yellow Coach & Mfg. Co., Pontiac, Mich., has become connected, as engineer in charge of radiator construction and equipment, with the Young Radiator Co., Racine, Wis.

HARRY B. BANNISTER has been elected secretary and general manager of the Irwkin Auger Bit Co., Wilmington, Ohio. He was manager of the Muncie Wheel Works from 1903 to 1923. Late in 1923 he left Muncie, Ind., for Florida, where he operated in real estate until early in 1929, when he joined the Irwkin company.

ARTHUR J. HERSCHEMANN, for some years in charge of the mechanical department of the George A. Fuller Co.

and the United States Realty Corporation, New York, and latterly a representative in the United States for a foreign maker of steel forgings and castings, has been made agent for the Witkowitz steel works of Czechoslovakia, to specialize in forgings and castings, with headquarters at 50 Church Street, New York.

ROBERT G. GUTHRIE, president, American Society for Steel Treating, was the speaker at the dinner given by the Rockford, Ill., chapter on Jan. 10. Mr. Guthrie, who is consulting metallurgist for the People's Gas, Light & Coke Co., Chicago, discussed "Control of Carburization and Decarburization of Iron and Steel."

J. H. PORTER, president, Calumet Steel Co., Chicago, has left for a three months' sojourn at Miami Beach, Fla.

AVERY C. ADAMS, heretofore assistant to the president of the General Fireproofing Co., Youngstown, has been appointed vice-president in charge of sales. E. A. PURNELL, identified with the company for 16 years, has been named sales manager.

H. C. JONES, who has been identified with the Minnesota Steel Co., Duluth, since 1913, has been appointed general superintendent. He attended both grade and high schools at New Castle, Pa., and served his apprenticeship in the machinists' trade at the New Castle works of the Carnegie Steel Co. FREDERICK D. KNIGHT, who was engaged by the Minnesota Steel Co. as storekeeper in 1915 and five years later became assistant purchasing agent, has been appointed general purchasing agent of the Minnesota Steel Co. and the Morgan Park Co. H. H. LUMLEY, general secretary to the late Samuel B. Sheldon since 1915, has been made assistant to President LOUIS C. REIS. He went with the Minnesota company in 1910, when the plant was under construction, as storekeeper in charge of all materials.

ROBERT E. KINKEAD, consulting engineer specializing in arc welding, has moved his Cleveland office to the Builders Exchange Building. He has also opened a Chicago office at 330 North Western Avenue.

Taylor Society Meeting

The Metropolitan section of the Taylor Society will hold its next meeting Jan. 24 instead of Jan. 23, as reported last week. The place of meeting will be the Fraternity Clubs, 22 East 38th Street, New York, and the program will be preceded by a dinner, which will be served at 6:15 p. m. The speaker will be Dr. Lillian M. Gilbreth, who will report on the World Engineering Congress held in Tokio, Japan, in November, 1929.

OBITUARY

FRANCIS H. TREAT, mechanical engineer and for many years prominently connected with the steel industry, died at his home in Cleveland, Jan. 9, aged 73 years. He was born in western New York and when a boy moved to Joliet, Ill., where at the age of 18 he entered the employ of the Illinois Steel Co., as draftsman. Leaving the Joliet plant in 1889 he spent the following 15 years as superintendent of various steel plants: the Duquesne works of the Carnegie Steel Co., the North Chicago works of the Illinois Steel Co., the Cleveland Rolling Mill Co., now the Newburgh plant of the American Steel & Wire Co., and the Jones & Laughlin Steel Co. His chief interest lay in the improvement of mechanical processes for the manufacture of steel and the production of power. His inventions are in use in steel plants throughout the United States. He became a consulting engineer in 1903 and for a time specialized in power and mining machinery. This brought him into contact with the Guggenheim interests and he spent some time in Mexico and the southwest as their technical expert. During recent years he had devoted his attention largely to the development of a gas producer. At the time of his death he was associated as gas producer expert with the Duff Patents Co., Pittsburgh.

WARREN P. KING, vice-president, Aluminum Co. of America, died Jan. 15 at Sarasota, Fla., where he had gone to spend the winter. He was 64 years of age. He was born in Ithaca, N. Y., and was a graduate of Cornell University.

MARTIN J. DOWLING, formerly general superintendent of the South Side, Pittsburgh, plant of the Jones & Laughlin Steel Corporation, died at his home in Pittsburgh on Jan. 17, aged 76 years. He was a native of Pittsburgh, and had retired from active business nine years ago.

JOHN H. MITCHELL, sales manager in the Central district for the Standard Steel Car Co., with headquarters at Pittsburgh, died suddenly in New York on Jan. 16, where he had gone to attend a convention. He was born at New Brighton, Pa., in 1872, and after graduation from Cornell University, entered the mechanical engineering department of the Pittsburgh & Lake Erie Railroad. He became associated with the car building industry in the sales department of the Pressed Steel Car Co., later having served as manager of sales. Before becoming identified with the Standard company he served for a time as acting president of the American Steel Co. of Cuba.

HENRY R. BOND, JR., of New London, Conn., who died in New York on

Jan. 14 of pneumonia, was one of the founders of the New London Ship & Engine Co., and its secretary and treasurer for 15 years. He was 55 years old and was graduated from Yale University in 1894.

ERNEST L. BURRELL, formerly president of the Burrell Belting Co., Chicago, died in New York on Jan. 16, aged 65 years.

GEORGE J. LONG, who was vice-president of the United States Foundry & Pipe Co. until 1920, died suddenly in Louisville, Ky., on Jan. 15, aged 77 years. He had been president of Dennis Long & Co. until 1900, when the company was merged with other foundries and became part of the United States Cast Iron Pipe & Foundry Co.

JOHN A. MURPHY, open-hearth superintendent of the Scullin Steel Co., St. Louis, died on Jan. 12, aged 61 years. He had been connected with the company since 1901. He entered the steel industry as door boy in the open-hearth department of the old Pennsylvania Steel Co., Steelton, Pa., when he was 16 years old.

CLARENCE W. HODGES, purchasing agent for the Worthington Pump & Machinery Co., died at the Paterson, N. J., Hospital, Jan. 17, following an operation. He was born at Randolph, Vt., in 1876 and was graduated from Williams College in 1900. Previous to his connection with the Worthington company, he had been purchasing agent for the American Locomotive Co.

L. E. CURTIS, president, Lee Machinery Co., Detroit, died suddenly Jan. 3.

Freight May Be Allowed to Canadian Customers

WASHINGTON, Jan. 21.—Companies allowing freight in the United States may also allow it to Canadian customers without making Canadian shipments subject to dumping duty, according to a customs decision recently announced by the Canadian Commissioner of Customs, says a report received by the Department of Commerce from Commercial Attaché L. W. Meekins, Ottawa. The dutiable value will be the Canadian selling price plus freight allowance and the Canadian importer will remit the selling price minus freight allowance.

Another decision was to the effect that if the cash discount in the United States is only 1 per cent it cannot be more than that in Canada without the application of the dumping duty. If the cash discount in the United States is 5 per cent, the maximum in Canada is 2½ per cent.

Mixed Trends in European Markets

Good Home Trade in Britain, But Continental Steel Centers Face
Disorganized Business—Cartels Still Important Factors

(By Cable)

LONDON, ENGLAND, Jan. 20.

PIG IRON demand is light, but producers are increasingly confident that a revival of buying is impending. The current Cleveland furnace output is being fully absorbed, but hematite supplies have been increased by the Consett Iron Co., Durham, blowing in a large furnace which has eased the market for prompt shipment. Forward sales of hematite have been made to domestic and Italian users at full market prices.

Finished steel inquiry is improving, but business, especially for export, is still meager. Mills are fairly well engaged executing old contracts, specifications for which are coming in steadily.

Tin plate is quiet, but inquiry is increasing. Mills not members of the association have been shading prices to obtain prompt lots, but other mills are well booked.

Galvanized sheets are quiet, and prices are easier, with makers seeking orders. Black sheets are inactive and prices are weak.

Vickers, Armstrong & Co. have secured a contract for two 20,000-ton vessels for the Peninsular & Orient. The Vulcan Foundry Co., Newton-le-Willows, has booked 20 locomotives for the Central Argentine Railway.

The Continental market is still disorganized and practically no important business is being booked. The

International Steel Cartel is believed to have found a basis for renewal of its agreement for six months more and is expected to arrange the guiding principles on sales by its members, early in February.

Belgian steel works have concluded an entente to be effective until July,

pending formation of sales offices. Controlling offices are to be established at Charleroi and Liège, and quotas will be based on output from January, 1928, to the end of October, 1929. All products are included in the cartel, except heavy and thin gage sheets.

British Trade in Iron and Steel Is Good

Pig Iron Prices Strong—Steel Consumers' Requirements To Be Large—Tin Plate Makers Well Booked

LONDON, ENGLAND, Jan. 4.—Suspension of steel mills during the holidays decreased consumption of pig iron and increased stocks on furnace yards, but producers are well engaged and there has been no weakening of the market. The fuel situation is causing concern among pig iron and steel makers alike, since the Government's proposed program for the coal industry appears likely to increase prices. The steady improvement in the hematite iron market evident in the second half of last year is expected to continue. Most furnaces are well engaged and are still booking a substantial volume of export business, with prices showing a tendency to advance.

New business in steel has been small, but prospects are for an active

year among steel consumers. Shipbuilders have started the year with about 500,000 tons of shipping under construction, and a number of sizeable new contracts are on their books. Rail mills have a good tonnage of contracts, and construction and engineering companies are expected to place some heavy orders for steel. Export business, however, is unsatisfactory, except in certain specialties. The British Steel Makers' Export Association, recently formed, has not yet begun to function, but mills count on it to cope with the keen competition encountered in certain foreign markets.

Tin plate mills continue to be more active and prosperous than other producers of finished steel. Demand for tin plate is increasing and the plan of the Welsh mills for restriction of out-

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.88

British Prices f.o.b. United Kingdom Ports	
Cleveland No. 3 foundry	£3 12½s. to £3 13½s.
East Coast hematite	3 18½ to 4 1
Ferromanganese, export	12 5 to 12 15
Billets, open-hearth	6 2½ to 6 12½
Sheet bars, open-hearth	5 17½ to 6 5
Black sheets, Japanese specifications	12 10 to 0 18½
Tin plate, per base box	0 18¾ to 0 18½
Rails, 60 lb. and heavier	7 15 to 8 15
Steel bars, open-hearth	8 0 to 8 10
Beams, open-hearth	7 7½ to 7 17½
Channels, open-hearth	7 12½ to 8 12½
Angles, open-hearth	7 7½ to 7 17½
Ship plates, open-hearth	7 15 to 8 5
Black sheets, No. 24 gage	9 15 to 10 0
Galvanized sheets, No. 24 gage	12 2½ to 2.64

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3 7s. to £3 11½s.	\$16.35 to \$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3 5 to 3 6	15.86 to 16.11
Billets, Thomas	4 11 to 4 12½	22.20 to 22.57

Sheet bars, Thomas	4 11	to 4 13	22.20	to 22.69
Wire rods, low C., No. 5 B.W.G.	6 2	to 6 4	29.77	to 30.26
Rails, 60 lb. and heavier	6 8½	to 6 10*	31.35	to 31.72
Rails, light	6 1½		29.65	
Steel bars, merchant	5 5	to 5 6	1.14	to 1.15
Steel bars, deformed	5 3	to 5 5	1.12	to 1.14
Beams, Thomas, British standard	5 0	to 5 4	1.09	to 1.13
Channels, Thomas, American sections	5 12	to 5 14	1.22	to 1.24
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 0	to 5 6	1.09	to 1.15
Angles, Thomas, 3-in.	5 6		1.14	
Ship plates open-hearth inspected	7 2	to 7 5	1.55	to 1.58
Black sheets, No. 31 gage, Japanese	12 1	to 12 4	2.61	to 2.66
Hoop and strip steel over 6-in. base	5 11½	to 5 12½	1.21	to 1.22
Wire, plain, No. 8 gage	7 0		1.52	
Wire, galvanized, No. 8 gage	8 9		1.83	
Wire, barbed, 4-pt. No. 12 B.W.G.	11 1½		2.41	
Wire nails, base	0 6¼		\$1.55	per keg
Wire nails, assortments 1 to 6-in. keg	10 6½		2.69	

*Open-hearth steel, 8s. (\$1.94) per ton extra.

put has been successful. Most makers are booked ahead for about three months and in certain cases mills are well engaged for the entire first half of the year.

Belgian Bolt Makers Form Cartel

WASHINGTON, Jan. 21.—Seven Belgian manufacturers of bolts have organized a cartel to control sales in both domestic and export markets and to facilitate purchases of raw materials, according to a report received by the Department of Commerce from Brussels. The cartel will also seek to reduce overhead expenses. The producers in the cartel are: Usines Gilson, of La Croyere; Boulonnneries Cambier, of Morlanwelz; Boulonnneries de la Louviere, of La Louviere; Usines Boel, of La Louviere; Boulonnneries Meurice, of Gilly; Boulonnneries du Martinet, of Monceau sur Sambre; and Forges et Laminoirs de Baume, of Haine Saint Pierre.

Blast Furnace on Soviet Postage Stamp

MOSCOW, RUSSIA, Jan. 3.—To promote its new industrial loan, the Government has issued two postage stamps featuring industry. One bears a view of a metal works and the inscription, "More Metal, More Machines." The other shows a blast furnace and three columns representing pig iron output in millions of tons for 1913, 1928 and 1933, the total for the last-named year being the production the Government hopes to attain at the end of its present five-year program.

French Mills Develop Rust-Resisting Steel Alloys

PARIS, FRANCE, Jan. 4.—Two corrosion-resistant steel alloys have recently been developed and are being commercially produced by the Société Anonyme des Hauts Fourneaux, Forges et Acieries de Pompey, Meurthe-et-Moselle, France. The new alloys have been given the trade names of "Apso" and "Durapso." The former is said to have the physical characteristics of soft steel and is resistant to atmospheric and most acid corrosion. It is more expensive than ordinary steel, but considerably lower in price than the high chrome-nickel steels of the austenitic varieties.

"Durapso" is also rust-resisting and has an elastic limit about 50 per cent greater than soft steel. It is, in addition, ductile and not brittle. It is being offered for use in the automobile industry, as it is claimed that it permits a saving of 20 to 30 per cent in weight and, because of the price, is suitable for use in lightening chassis. It is also suggested for use in rolling stock for railroads and for the hulls of vessels, especially warships.

Following the success of Germany in constructing a cruiser in which a

light-weight hull was obtained by using plates of special analysis, French mills have been seeking a similar alloy and eight steel makers in France are now producing a chrome-copper steel alloy. It shows great resistance to corrosion, is low in price, but requires about 50 per cent more work for fabrication than carbon steel. It is also recommended for use in the automobile industry and for building railroad rolling stock.

Taxes Absorb Large Part of German Steel Profits

HAMBURG, GERMANY, Jan. 5.—Taxes and so-called social charges in the German steel industry have recently registered a further increase. It is claimed that about 52 per cent of the current gross income of steel producers is absorbed by this burden. When it is considered that, in addition, stockholders must pay a capital earnings tax on their income, the low value of steel stocks in Germany is in part explained.

Electrically Welded Bridge in Europe

HAMBURG, GERMANY, Jan. 5.—A bridge over the Sludwia River near Posen has been entirely electrically welded. It is 27 meters (89 ft.) long and weighs 55 tons, as compared with a probable weight of about 70 tons, if riveted. This is one of the first all-welded bridges constructed in Europe.

European Zinc Prices Still Declining

HAMBURG, GERMANY, Jan. 5.—Negotiations for a renewal of the European Zinc Cartel have been abandoned. Meanwhile, despite reports of a more stable market on zinc sheets, competition is still severe and German mills have increased their discounts. Zinc sheets have been sold as low as £24 15s. per metric ton (5.48c. per lb.), and large lots have brought out even lower prices.

Machinery, Castings and forgings in Canada

Machinery production in Canada in 1928 reached a new high record at \$51,046,140, according to the Dominion Bureau of Statistics, Ottawa. This is nearly double the 1924 total and represents an increase of 14 per cent above the previous record of \$44,602,135, made in 1927. More than 60 per cent of all came from the Province of Ontario. This province and Quebec furnished some 96 per cent of the total output.

The largest items in order of size were: pulp and paper machinery, office and business machinery, household machinery, all three of which exceeded \$6,000,000. Much smaller were the production of elevators, min-

ing and metallurgical machinery, waterwheels and turbines, metalworking machinery, transmission machinery, pumps, hoisting machinery, laundry machinery and flour and gristmill machinery, each unit representing over \$1,000,000 in output.

Production of castings and forgings in Canada in 1928 was \$81,904,852. This again is a new high record, surpassing the 1926 total of \$70,235,798 by nearly 17 per cent. About two-thirds of the total came from the Province of Ontario and more than 22 per cent from Quebec.

The largest items included heating and ventilating equipment, pipe, tubing and fittings and castings sold as such. All three of these exceeded \$10,000,000. Much smaller quantities were made of automobile parts, forgings sold as such, general machinery, chains, boilers, hardware and cold-rolled and cold-drawn steel, each of which exceeded \$1,000,000.

Steel Cartel Not Yet Able to Stabilize Prices

DÜSSELDORF, GERMANY, Jan. 4.—The International Steel Cartel is attempting to enforce uniform extras on iron and steel products for export. Although the new extras were effective Dec. 20, they are still nominal and little or no business has been transacted on the new basis. An effort to stabilize export prices on hot-rolled hoops was unsuccessful because of opposition by mills in Luxembourg and the Saar. The cartel is now trying to stabilize the market on cold-rolled hoops.

Fabricated Structural Steel Bookings a Record

WASHINGTON, Jan. 21.—Computed bookings of fabricated structural steel in 1929 aggregated 3,850,000 tons, much the largest for any year, and comparing with 3,287,900 tons in 1928, itself the previous record, according to reports received by the Department of Commerce. Shipments (also a new record) were 3,588,400 tons, or 78 per cent of capacity, compared with 3,126,200 tons, or 68 per cent of capacity. Actual orders reported last year represented 83 per cent of capacity, against 71 per cent for 1928.

A striking increase was made in orders in December, when compared with those of November. Actual bookings reported for December by 195 firms with a capacity of 303,595 tons, were 256,882 tons, or 84 per cent of capacity, against 184,417 tons or 59 per cent of capacity reported for November by 216 firms with a capacity of 311,360 tons. Computed bookings in December rose to 323,400 tons, against 227,150 tons in November (the lowest since January, 1928), while computed shipments declined from 288,750 tons to 273,550 tons, the lowest since last February.

Use of Manganese Ore in 1929

Imports Much Greater Than in 1928—Domestic Production Remains a Small Fraction of Import Total

IMPORTS of manganese ore in the first 11 months of 1929, expressed in manganese content, amounted to 308,113 gross tons. This was an increase of 65 per cent over the 187,012 tons imported in the corresponding period of 1928. More than one-half the 1929 total came from Russia, as is shown in the table. More than one-half of the remainder came from Brazil. British India was the third largest supplier, with the Gold Coast (Africa) in fourth place.

This same order of magnitude of supply prevailed in 1928, though in differing proportions, for Russia furnished only a little more than 40 per cent of the total and India supplied more than 21 per cent, against less than 12 per cent in 1929.

Domestic Production 7 Per Cent of Needs

These figures and the information which follows are contained in a survey of the international trade in manganese made by the Department of Commerce. This survey shows that the quantity of ore imported (total weight, not merely manganese content) was 427,708 gross tons in 1928, and that domestic production during the year, according to the United States Bureau of Mines, was only 46,636 tons, or less than 10 per cent of the combined total.

Stocks in bonded warehouses accounted for 366,954 tons at the beginning of 1928 and for 228,994 tons at the end of the year, making available for consumption during the year 612,304 gross tons. This is somewhat smaller than the amount made available for consumption in 1927, which was 658,854 tons.

Domestic production in that year was a little less than in 1928, but imports were much higher, with the result that production was less than 7 per cent of the combined production and import total.

Relating domestic production to the total amount put into consumption it appears that in 1928 production was 7.6 per cent of the total and in 1927 it was 6.8 per cent.

Principal Producers and Exporters

During the Russian economic year 1928-1929 (ended Sept. 30) Russia is reported to have exported 930,000 tons of manganese ore. Of this amount 358,537 tons was shipped to the United States, 150,184 tons to Germany, 129,973 tons to France, and the remainder to 10 other European countries.

Brazilian output in the first 10 months of 1929 amounted to 263,265 gross tons, or 4 per cent less than in the like period of 1928. Exports in the first 10 months were 258,366 tons, or about 11 per cent less than in the same period of 1928. Of the 1929 exports, 203,384 tons, or about 79 per

cent, were destined for the United States. France was the recipient of 28,482 tons and Belgium of 26,500 tons. The small decreases in output and exports are attributed to the Russian situation, as internal conditions were satisfactory on the whole throughout the year.

Gold Coast exports of the African Manganese Co. through the port of Sekondi were 370,366 tons of manganese ore in the fiscal year 1928-1929 (ended March 31). This was an increase of about 10 per cent over the 1927-1928 shipments.

Russian Shipments Depress Markets

It has become evident that the increased output of Russian manganese ore has had a decided effect on world markets. This increase is expected to continue, although during the first year of a five-year program production fell far short of the 1,230,000 tons anticipated. Actual output is estimated at 750,000 tons. The effect of lowering prices has been favorable to consumers but, of course, not to competing producers.

Reports emanating from the principal producing regions of the world indicate that total production for 1929 exceeded the 1928 figure. The United States is the leading consumer, with France, Great Britain, Belgium, Germany and Japan following, generally in that order.

Slight Reduction in Wholesale Prices

Wholesale commodity prices reported by the United States Bureau of Labor Statistics showed a decline in December to 94.2, compared with 94.4 in November. The basis is 100 as the average of 1926; in December, 1928, the figure was 96.7. Except for farm products, building materials and housefurnishing goods, all of which showed a rise during December, the major groups registered declines, mostly fractional.

Metals and metal products dropped from 102.3 to 102.1, owing to declines in both the iron and steel and the non-ferrous components. Iron and steel became 96.3 in place of 96.5 in

November, and non-ferrous metals 101.5 in place of 102.4. The three other components of the metals group showed no change—agricultural implements, automobiles and "other metal products."

Building materials showed a slight rise, due to a considerable increase in cement prices. The structural steel component remained stationary at 97.

Dividing the commodities up in another way, the bureau shows that raw materials increased in price from 94.8 to 95, while both semi-manufactured articles and finished products were lower in December than in November. The semi-manufactures declined from 95.6 to 94.3 and the finished products from 94.2 to 93.9.

Record Production of Motor Vehicles

WASHINGTON, Jan. 21.—Establishing several new records, production of motor vehicles in the United States in 1929 totaled 5,358,361 units, against 4,350,759 in 1928, according to reports received by the Department of Commerce. Passenger car output last year was 4,586,020, against 3,821,136 the previous year; while production of trucks totaled 754,752 and 530,910, respectively. There were 17,589 taxicabs produced last year, compared with 6713 in 1928. In each case cited the figures were the highest ever made.

Production of motor vehicles in December, however, declined to 119,950 units, against 217,570 in November, and was only slightly more than one-half the 234,116 of the closing month of 1928. Of the December production, 91,234 units were passenger cars, against 169,282 in November; truck production was 27,233, against 46,642; taxicab output was 1483, compared with 1646. Except for taxicabs, the December figures were much the lowest of the year, and those for November were second lowest.

Canadian production in 11 months was reported some days ago by the Dominion Bureau of Statistics, Ottawa, at 257,800. Estimating 5000 for December, against 9424 in November, would make 262,800 for the year. This would raise the entire American and Canadian output to 5,621,000 units, compared with 4,601,141 in 1928, representing a gain of 22 per cent. The United States gain was 23 per cent.

Foundry and Other Equipment and Malleable Castings

	December, 1929	November, 1929	December, 1928
Malleable castings produced(a), net tons	45,083(b)	46,448	59,428
do. do. 12 months	823,799(c)	—	779,477
do. orders booked....	42,789	40,163(b)	61,182
do. do. 12 months	784,736(c)	—	758,890
Foundry equipment orders(d), index....	208.0	128.6	166.5
do. unfilled orders....	473.2	445.4	333.8
do. shipments....	201.9	152.2	234.6
Electric industrial trucks and tractors shipped(a).....	149	116	152
do. 12 months.....	2,019(c)	—	1,466

(a) United States Department of Commerce. (b) Lowest since December, 1927. (c) Greatest on record. (d) Foundry Equipment Manufacturers' Association: Index is based on 100 as average shipments of 1922-1924.

Machinery Markets and News of the Works

Machine Tool Orders Low

Volume of Business Has Dropped This Month But
Inquiries Are Numerous

MACHINE tool buying, which had a little spurt in some districts in the first week of the month, has dropped off considerably since that time. A Chicago estimate is that dealers' sales in that district are not more than 60 per cent of the January volume last year.

Inquiries are numerous, however. Although quotations have been going out freely this month, prospective buyers are slow in closing, and possibly are awaiting a more definite improvement in general business.

Some fairly good business is in sight. A Western farm implement manufacturer has inquired for 14 items. The American Bridge Co. is in the market for nine radial drills. The American Steel Foundries will buy a carwheel lathe and a toolroom lathe. The Santa Fe Railroad has added to

its recent list three radial drills, a planer and four double-wheel floor grinders.

Considerable business is in prospect from the Western Electric Co., which will make large additions to its plants at Kearny, N. J., and Chicago. These orders may not develop for some time.

The Allis-Chalmers Mfg. Co., Milwaukee, has placed several orders for its Springfield, Ill., tractor plant, and the A. O. Smith Corporation, Milwaukee, has closed for a small list of machine tools, including a number of turret lathes. The Lycoming Mfg. Co., Williamsport, Pa., has ordered five turret lathes.

A Cleveland manufacturer of turret lathes has advanced prices 6 to 8 per cent, effective Jan. 15, and it closed a fair amount of business prior to that date at the old quotations.

New York

NEW YORK, Jan. 21.—Machine tool business has not maintained the pace that was set in the first few days of the month, when a number of fairly good orders were received by local dealers and direct representatives. Local sellers have quoted this month on a good deal of prospective business, but the placing of orders is being delayed in many instances pending a clearer view of the nearby business situation.

Brooklyn & Queens Transit Corporation, 385 Flatbush Avenue Extension, Brooklyn, has plans for a one-story repair shop and terminal shed at Surf and Stillwell Avenues, to cost over \$50,000 with equipment. C. W. Burke is assistant chief engineer.

Bell Telephone Laboratories, Inc., 463 West Street, New York, telephone and radio equipment, has leased six floors in building in course of construction at 180 Varick Street, totaling 134,000 sq. ft. floor space, for expansion in research and development work. Possession will be taken in about four months.

Harry M. Sushan, 367 Fulton Street, Brooklyn, architect, has plans for a two-story automobile service, repair and

garage building, to cost about \$100,000 with equipment.

Board of Education, Albany, N. Y., has plans for three-story high school, including manual training department, to cost more than \$850,000. A. Delehanty, 121 North Pearl Street, is architect.

New York Power & Light Corporation, 126 State Street, Albany, N. Y., will soon take bids for one-story repair shop, equipment storage and distributing plant, including automobile service and garage building and office, to cost over \$150,000 with equipment. Stevens & Wood, 60 John Street, New York, is architect and engineer.

Bids will be received until Feb. 5 by Department of Mental Hygiene, Capitol Building, Albany, N. Y., for an electric generator and engine, with auxiliaries, for State hospital at Central Islip, N. Y.; until Feb. 19 for similar units for State hospital at Utica. Plans and specifications at office of Commissioner of Architecture, 353 Broadway, Albany.

Board of Education, Park Avenue and Fifty-ninth Street, New York, is considering installation of manual training equipment in new Walton high school in Bronx, for which superstructure will soon begin, to cost \$2,000,000; also in new Grover Cleveland High School, Ridge-

wood, Queens, to cost \$1,750,000. William C. Martin is architect for board.

Associated Gas & Electric Co., 61 Broadway, New York, operating electric light and power properties in New York, New Jersey and other States, has arranged for a bond issue of \$30,000,000, part of fund to be used for expansion and improvements.

T. Engelhardt, 101 West Thirty-first Street, New York, architect, has plans for a four-story automobile service, repair and garage building at Forest Hills, N. Y., to cost over \$350,000 with equipment.

Edward Ehrbar, Inc., 29 Meserole Avenue, Brooklyn, contractors' machinery and equipment, has purchased property at White Plains, N. Y., totaling 10,000 sq. ft., for branch storage and distributing plant, with service and repair department, to cost over \$40,000.

Universal Tobacco Machine Co., Sussex Avenue and Dey Street, Newark, N. J., has leased factory, now in course of erection at Paris and Niagara Street, 135 x 185 ft., totaling about 25,000 sq. ft. floor space, for new plant.

Joseph Weisberger, 69-73 Badger Avenue, Newark, has filed plans for a one-story machine shop, 135 x 185 ft., at 183-97 Magra Street, to cost about \$40,000 with equipment.

Metal & Thermit Corporation, 120 Broadway, New York, has awarded a general contract to Morrison E. Sherman Corporation, 223 Grove Street, Elizabeth, N. J., for one-story addition to plant at Carteret, N. J., 80 x 120 ft., to cost about \$30,000 with equipment.

Beckwith-Chandler Co., Wright Street and Avenue B, Newark, manufacturer of varnishes, colors, lacquers, etc., will take bids on general contract early in February for three-story addition, for which revised plans are being completed, to cost \$100,000 with equipment. Abbott, Merkt & Co., 175 Fifth Avenue, New York, are architects.

Board of Education, City Hall, Newark, is asking bids on general contract until Jan. 30 for new three-story Fawcett School of Industrial Arts, 100 x 120 ft., to cost more than \$200,000 with equipment. Guilbert & Betelle, 20 Branford Place, are architects.

Atlantic Refining Co., 291 Broadway, New York, with headquarters at 260 South Broad Street, Philadelphia, is considering new oil storage and distributing plant at Plainfield, N. J., to cost over \$75,000 with equipment.

Cooper-Hewitt Electric Co., for past 10 years a subsidiary of General Electric Co., will henceforth be known as General Electric Vapor Lamp Co., according to an announcement by William A. D. Evans, president. Company's plant is at Hoboken, N. J., and specializes in manufacture of Cooper-Hewitt lamps for industrial purposes and for photographic studios, as well as quartz ultra-violet lamps, mercury switches, low voltage Neon tube lamps and Neon glow lamps. The trademark, Cooper Hewitt, will be retained.

New Standard Aircraft Corporation, Paterson, N. J., informs THE IRON AGE of a contemplated 1930 output of 150 airplanes, as compared with an output of 62 in 1929. Company moved into a new factory last year and may build an addition soon for assembly.

R. G. Smith Tool & Mfg. Co., Newark, manufacturer of tools, dies, jigs, fixtures, screw machine products and special machinery, is now operating in its new plant at 245 South Street.

Major Aircraft Corporation has leased space in a building at 129-133 Grand Avenue, Brooklyn, to manufacture airplanes of about 110 hp., designed to carry their own structural weight in load. Catalogs covering materials and equipment used in airplane construction are desired. Curtis Wright heads company.

Philadelphia

PHILADELPHIA, Jan. 20.—Sun Oil Co., 1608 Walnut Street, Philadelphia, has begun expansion program at No. 10 plant at Linwood, Marcus Hook, Pa., to include installation of new filtering station and other refining facilities, steel tanks and other equipment, to cost more than \$2,500,000 with pipe lines and other operating facilities.

E. I. duPont de Nemours & Co., Ledger Building, Philadelphia, has filed plans for two additions to paint and varnish works, one and two stories, to cost \$76,000 and \$50,000, respectively, with equipment. Headquarters are at Wilmington, Del.

Eugene A. Stopper, Fuller Building, Philadelphia, architect, has awarded general contract to Nelson Pedley Construction Co., 1512 Chestnut Street, for automobile service, repair and garage building, to cost \$110,000 with equipment.

Philadelphia Iron Works, Inc., has been organized under State laws to take over and operate company of same name, with plant at 1708 Callowhill Street, to manufacture tanks, stacks and other plate products, as well as boiler repairs, etc. Company is headed by George M. Rivel, Palmyra, N. J.; George H. Staley, Conshohocken, Pa., and Stephen Patrick, 1805 Church Street, Philadelphia.

Shell Eastern Petroleum Products Co., Elverson Building, Philadelphia, with headquarters at 112 East Forty-second Street, New York, has asked bids on general contract for storage and distributing plant to cost about \$125,000 with equipment.

Aircraft Engine Corporation, Camden, N. J., has awarded general contract to Bennett McLaughlin Co., 3434 Sansom Street, Philadelphia, for one-story plant, 75 x 150 ft., at Central Airport, for parts and assembling service, to cost \$35,000 with equipment. Four testing blocks for airplane motors will be constructed near plant site, each to cost about \$10,000.

W. Macy Stanton, Land Title Building, Philadelphia, architect, has plans for five-story automobile service, repair and garage building at Atlantic City, N. J., to cost over \$100,000 with equipment.

Alan Wood Mining Co., a subsidiary of Alan Wood Iron & Steel Co., Conshohocken, Pa., is beginning improvement program to cost about \$100,000 with equipment, at iron ore mining properties at Oxford, N. J., recently secured under long-term lease, and expects to have plant ready for service early in April. Subsidiary company is reported planning development of iron ore mining plant near Ivy Rock, Pa., to cost over \$200,000.

Atlantic City Electric Co., Atlantic City, N. J., has secured right-of-way for steel

The Crane Market

FRESH inquiries for overhead traveling cranes are beginning to accumulate, but awards are still limited. In a few cases prospective buyers of overhead equipment have postponed purchase for a month or more. The Phoenix Utility Co., 71 Broadway, New York, has placed a 125-ton, 98-ft. span overhead crane with the Cleveland Crane & Engineering Co. In the Pittsburgh district the Carnegie Steel Co. has bought two 25-ton overhead cranes from an unnamed builder. Inquiry for locomotive cranes is light. The Erie Railroad Co. has closed on two 25-ton, 8-wheel, steam-driven locomotive cranes with the Orton Crane & Shovel Co.

tower transmission line from new steam-operated electric generating plant at Deepwater Point to Paulsboro, N. J., where large power substation will be operated, to cost over \$100,000.

Lycoming Mfg. Co., Williamsport, Pa., a subsidiary of Auburn Automobile Co., Auburn, Ind., is completing addition and facilities for aircraft engine production, including parts and assembling. An order for 500 engine units has been secured from Stinson Aircraft Corporation, Wayne, Mich., with entire delivery May 1.

New Jersey Water Co., 610 Station Avenue, Haddon Heights, N. J., is planning extensions and improvements to cost about \$50,000, including installation of pumping machinery, filtration equipment, sarrators and other equipment. E. H. Smith is vice-president and general manager.

Board of Education, Nazareth, Pa., is considering installation of manual training equipment in addition to high school to cost over \$175,000, for which plans are being drawn by Rasmussen & Wayland, 36 West Forty-seventh Street, New York, architects.

Pitcairn Aircraft, Inc., formerly of Bryn Athyn, Pa., has moved its general offices and factory to Pitcairn Field, Willow Grove, Pa.

New England

BOSTON, Jan. 20.—Machine tool business, according to dealers, is practically at a standstill. New inquiries are scarce and there is no indication when buying against pending business will begin.

New England Body Co., Providence, R. I., has closed bids on a two-story and basement radiator repair shop, 27 x 42 ft.

Southern New England Ice Co., Hartford, Conn., has closed bids on a one-story ice manufacturing plant, to cost \$150,000 with equipment.

Portland Terminal Co., Portland, Me., will soon award contracts for a coal discharging plant and other improvements. Four five-ton gantry cranes are required.

A. F. Robinson Boiler Works, Inc., East Cambridge, Mass., has awarded general contract to Scully Co., 238 Main Street, Cambridge, for one-story addition, 42 x 195 ft., to cost about \$30,000 with equipment.

Following recent organization of Fitchburg Engineering Corporation, Fitchburg, Mass., by former executives of local Putnam plant of Manning, Maxwell & Moore, Inc., company has taken over plant of

Fitchburg Steam Engine Co., for steam engine production, machine tools and other mechanical equipment. New company is capitalized at \$100,000, and is headed by William O. Forman, Phillip E. Arthur and Ernest L. Fickett.

Ovens, power equipment, conveying and other machinery will be installed in new baking plant to be erected at Bridgeport, Conn., by Dugan Brothers, Inc., 290 South Fifth Street, Brooklyn, N. Y., to cost over \$300,000 with equipment. Fletcher-Thompson, Inc., 542 Fairfield Avenue, Bridgeport, is architect and engineer.

Chapman Valve Co., Pinevale Street, Springfield, Mass., manufacturer of gate valves, etc., has taken out a permit for one-story addition, to cost over \$30,000 with equipment.

Central Maine Power Co., Augusta, Me., will begin work early in spring on new hydroelectric generating plant on Kennebec River, near Bingham, Me., three stories, 60 x 158 ft. Contract for superstructure has been let to Morton C. Tuttle Co., 31 St. James Avenue, Boston. Project will cost over \$2,000,000. J. C. and J. H. Stevens, 477 Congress Street, Portland, Me., are architects.

Luders Marine Corporation, Stamford, Conn., plans rebuilding part of shipyard destroyed by fire Jan. 17.

Hain Brothers, Railroad Yard, Norwalk, Conn., have plans for a one-story ice-manufacturing plant, 50 x 150 ft., to cost about \$35,000 with equipment.

Emerson Chair & Novelty Co., Derry, N. H., has taken over textile plant of Dundee Mills, Inc., Hooksett, N. H., for manufacture of toys, chairs and kindred specialties, and will remove to new location and increase output.

South Atlantic

BALTIMORE, Jan. 20.—Locke Insulator Corporation, Cromwell and Charles Streets, Baltimore, manufacturer of high-tension electrical insulators, has plans for three one and two-story additions, to cost over \$75,000 with equipment. W. S. Austin, Maryland Trust Building, is engineer.

American Oil Co., American Building, Baltimore, has plans for storage and distributing plant at Lakewood, N. J., to cost over \$60,000 with equipment. T. J. O'Connell is company engineer.

Washington County Board of Education, Court House, Hagerstown, Md., is considering installation of manual training equipment in new junior high school, to cost more than \$175,000. C. E. Kounz, Young Building, is architect.

Hinde & Dauch Paper Co., Sandusky, Ohio, manufacturer of corrugated fiber containers, boxboard products, etc., has acquired plant and business of David M. Lea & Co., Richmond, Va., manufacturer of kindred specialties, and will consolidate. Richmond plant will be continued and improvement program carried out.

South Carolina Power Co., Charleston, S. C., has secured a light and power franchise at McClellanville, S. C., and is considering steam-operated electric generating plant at that place.

Glenn L. Martin Co., Baltimore, manufacturer of military aircraft, flying boats, etc., which recently established local plant following sale of Cleveland works, has acquired Chevrolet Aircraft Corporation, Indianapolis, manufacturer of airplane motors, headed by Louis Chevrolet, and will operate as a subsidiary. Indianapolis plant will be removed to Baltimore, where expansion will be carried out, par-

ticularly in straight-line, four-cylinder, air-cooled, inverted motor units, including parts and assembling, which will be used in Martin company planes. Mr. Chevrolet will continue with company and will be chief engineer for Martin organization.

Standard Oil Co. of New Jersey, Montgomery Building, Spartanburg, S. C., has awarded general contract to C. M. Guest & Son, Anderson, S. C., for extensions and improvements in storage and distributing plant at Spartanburg, including new two-story unit, 60 x 100 ft., to cost about \$75,000 with equipment. Headquarters are at 26 Broadway, New York.

Board of District Commissioners, District Building, Washington, is asking bids until Feb. 7 for 100 steel tables.

Ovens, power equipment, conveying and other machinery will be required in connection with rebuilding plant of Lee Baking Corporation, Winchester, Va., destroyed by fire Jan. 13, with loss reported over \$200,000 including equipment.

City Council, Rock Hill, S. C., will receive bids until Jan. 29 for an elevated steel wash water tank of 25,000-gal. capacity, and auxiliary equipment, for new filtration plant for municipal water works, for which bids are being asked at same time. Robert & Co., Bona Allen Building, Atlanta, Ga., are engineers.

City Council, Wilson, N. C., will make extensions and improvements in municipal electric light and power plant, including installation of 5000-kw. generating unit and auxiliary equipment to double present capacity. William C. Olsen, Exchange Place, Raleigh, N. C., is engineer.

Board of Trustees, Morgan College, Morgan Park, Baltimore, will take bids early in February for three-story industrial science building, to cost \$120,000 with equipment. E. L. Tilton, 141 East Forty-fifth Street, New York, is architect.

Potomac Edison Co., Hagerstown, Md., is planning expansion and improvements to cost about \$1,200,000.

Utilities Gas & Electric Co., 22 West Monroe Street, Chicago, is considering an artificial gas plant at Hendersonville, N. C., where franchise was recently secured, to cost more than \$100,000.

Pittsburgh

PITTSBURGH, Jan. 20.—Inquiries for machine tools continue to come out, but even though local dealers are working on a number of active projects January orders have been rather disappointing. With the exception of that of the Westinghouse Electric & Mfg. Co., large industrial lists are almost completely lacking and the bulk of the present business is accounted for by single tool orders. The railroads are not buying, and many are not even showing interest in their 1930 tool requirements.

Makers of heavy machinery and equipment in this district continue busy and considerable new business has been received since the first of the year. The Great Lakes Steel Corporation, Detroit, has placed the mills for its new plant with Pittsburgh district builders, and the National Tube Co. recently awarded contracts for three open-hearth furnaces at its new McKeesport, Pa., plant to the Pennsylvania Engineering Works, New Castle, Pa.

Quaker State Oil Refining Co., 6500 Kelley Street, Pittsburgh, has acquired oil refinery and business of McKean County Refining Co., Farmers Valley, Pa. Ex-

pansion will be carried out at latter plant, particularly in lubricating oils for automobiles.

Dixon Motor Co., Inc., 2507 Beale Avenue, Altoona, Pa., manufacturer of motor trucks, has plans for one and two-story plant, totaling about 12,000 sq. ft. floor space, to cost over \$80,000 with equipment.

Edward E. Walker, 555 West Sixth Street, Erie, Pa., and associates have organized Walker Corporation and plan operation of local plant for manufacture of iron, steel and other metal products. Charles H. English, Erie, is also interested in new company.

West Virginia Power & Transmission Co., 14 Wood Street, Pittsburgh, a subsidiary of West Penn Electric Co., same address, is considering plans for a hydroelectric power project on Cheat River, West Virginia, to cost over \$450,000. J. K. Anderson, Charleston, W. Va., is engineer.

Pittsburgh office of Reliance Electric & Engineering Co., Cleveland, has been moved to larger quarters at 2300 Koppers Building. B. J. Ballard continues as district sales manager with C. V. Gregory as assistant.

Buffalo

BUFFALO, Jan. 20.—International Graphite & Electrode Corporation, Niagara Falls, N. Y., recently organized by E. Ray Speare, 61 Montvale Road, Newton Centre, Boston, and associates, has asked bids on general contract for one-story plant, 125 x 200 ft., on Pine Avenue, where several acres have been secured, to cost more than \$100,000 with electric furnaces and other equipment. Company is capitalized at \$250,000 and 2500 shares of stock, no par value. Others interested include W. A. Harty, 305 Woodbridge Avenue, Buffalo; William Kaul and Dudley H. Miller, both of St. Marys, Pa. Mr. Harty will be president.

Niagara-Hudson Power Co., Electric Building, Buffalo, has enlarged construction program at local steam-operated electric generating plant, where work is under way on additions, and will increase capacity by 314,000 hp., rather than 207,000 hp., as initially planned, more than doubling present output, to cost more than \$1,500,000. Extensions will be made in transmission lines and distributing system. Company has filed plans for two power substations to cost over \$50,000. Malone Light & Power Co., Malone, N. Y., a subsidiary, has acquired Port Covington Light, Heat & Power Co. and Milling & Lighting Co., and will carry out expansion, including transmission lines.

G. A. Young, McCarthy Building, Syracuse, N. Y., architect, has plans for a three-story automobile service, repair and garage building, to cost about \$100,000 with equipment.

Precision Motor Rebuilders, Inc., Rochester, N. Y., care of Franklin R. Mullan, 517 Frost Avenue, recently formed by Mr. Mullan and associates, plans operation of repair works, including parts production for automobiles and other equipment.

Richfield Oil Corporation of New York, Inc., Chanin Building, New York, a subsidiary of Richfield Oil Corporation, Los Angeles, has acquired Super Service Stations, Inc., Lockport, N. Y., for about \$750,000 and will increase capacity in storage and distributing plants in this district.

General Aviation Co., Syracuse, N. Y., operating at local field at Amboy, has

arranged for change of name to Hub Aviation Co.

Acheson Oildag Co., Buffalo Avenue, Niagara Falls, N. Y., manufacturer of graphite lubricants, has increased capital from \$100,000 to \$250,000 for expansion.

Chicago

CHICAGO, Jan. 20.—Dealers' sales in this district are averaging about 60 per cent of the volume a year ago. In some directions, however, business is heavy, as evidenced by the fact that several manufacturers report order books larger than in January, 1929, and in one instance, deliveries have been extended six weeks since the early part of January. The Western Electric Co. is planning large additions to its Chicago plant. This company farmed out much work in 1929. Many orders were cancelled in November and December, but in recent weeks much of this work has been reinstated in independently-operated tool and die shops.

American Steel Foundries will buy a carwheel lathe and a tool-room lathe, and the Santa Fe has added to its list two 4-ft. radial drills, a 6-ft. radial drill, a 36-in. x 36-in. x 12-ft. planer, and four double-wheel floor grinders. Allis-Chalmers Mfg. Co. has placed several orders for its Springfield, Ill., tractor plant, and A. O. Smith Corporation, Milwaukee, has closed for machine tools, including a number of turret lathes. The used tool market is quiet.

A Western farm implement manufacturer is inquiring for the following tools:

One 12-in. high-speed drill.
Four 20-in. and one 22-in. drill press.
Two 16-in. shapers.
One 10-in. lathe.
One 13-in. x 48-in. lathe.
One 36-in. and one 48-in. planer.
One 24-in. and one 26-in. shaper.

Western Electric Co. will expend \$17,000,000 on enlargement of its Hawthorne plant at Chicago. Much of this amount will be used for buildings to care for departments now temporarily housed in various districts in Chicago. Expenditures also will be made for tools and equipment.

Gardner-Denver Mfg. Co., Williamson Street, Quincy, Ill., manufacturer of air compressors, pumping equipment, etc., is contemplating one-story addition, to cost over \$40,000 with equipment.

Standard Oil Co. of Indiana, Main Street, Decatur, Ill., is considering new storage and distributing plant at Alton, Ill., to cost about \$80,000 with equipment. A similar plant is being projected at Belleville, Ill., to cost close to \$50,000.

Precision Machine Co., Pueblo, Colo., is planning one-story addition to machine shop, 25 x 100 ft., including improvements in present plant, to cost about \$25,000 with equipment.

Iowa-Nebraska Light & Power Co., Shenandoah, Iowa, is planning to rebuild part of artificial gas plant destroyed by fire Jan. 14.

King Ventilating Co., North Cedar Street, Owatonna, Minn., manufacturer of ventilating equipment, is erecting two-story addition, 70 x 75 ft., to cost about \$40,000 with equipment.

Minneapolis Gas Light Co., Minneapolis, Minn., is disposing of a note issue to total \$7,500,000, part of proceeds to be used for extensions and improvements in artificial gas plants and system.

Denver & Rio Grande Western Railroad Co., Denver, is considering new engine house and shops for Mallet type locomotives at Pueblo, Colo., to cost more than \$80,000 with equipment. Company engineering department will be in charge.

Railroad Supply Co., 4556 West Grand Avenue, Chicago, manufacturer of railroad signal equipment and kindred specialties, has leased a plant in course of construction in Clearing Industrial District, covering about four acres, and will remove to new location. It has also secured additional land on neighboring tract, totaling 186,000 sq. ft., and has taken an option on other property in same district. Company has recently purchased a going factory at Carpenterville, Ill., and will remove to Clearing plant.

Wyoming Carbonizing & Briquetting Co., Kemmerer, Wyo., C. D. Stafford, head, plans fuel briquette plant at Conroy, Wyo., to cost over \$300,000, with equipment.

Dwyer Equipment Co., Chicago, maker of unit heaters, has been purchased by C. A. Dunham Co., Chicago, manufacturer of steam heating appliances. Lawrence P. Dwyer, formerly president of Dwyer company, will be general manager of unit heater division, and William J. Mauer, formerly vice-president, will be sales manager of the division, with offices in Dunham company's building at 450 Ohio Street. Dwyer plant will be moved to new factory of Dunham company at Michigan City, Ind. Certain brass parts will be made at company's foundry at Marshalltown, Iowa, and machined at its plant in that city.

Ziv Steel & Wire Co., Chicago, has removed its Detroit branch office and warehouse from 2125 Mack Avenue to 14,643 Meyers Road, where it has completed a new office and warehouse building.

Aemite Die Casting & Mfg. Co., has moved to Woodstock, Ill., from 2640 Belmont Avenue, Chicago.

H. K. Ferguson Co., Cleveland, engineer and builder, has leased space at 520 North Michigan Avenue, Chicago, for branch office. Henry Maag, for ten years with company, will be in charge.

Milwaukee

MILWAUKEE, Jan. 20.—Manufacturers and dealers report a gradual increase in machine tool sales, with orders mostly for single machines. Tractor and agricultural implement manufacturers at Racine and Milwaukee are operating some departments on a 24-hr. schedule, and many of these plants have increased payrolls about one-third, but are not yet employing at peak figures. Production of small and medium-sized passenger automobiles has reached last year's output for this period, but dealers are reluctant to order large cars.

Chicago, Milwaukee, St. Paul & Pacific Railway Co. expects to complete its new \$1,000,000 addition to West Milwaukee shops latter part of next month, but considerable equipment that will eventually be installed has not yet been purchased. Most of the freight cars will be built at this plant and a large portion of de luxe passenger equipment, as heretofore, will be completed at this point, which has now become the principal car building and repair works on Milwaukee road's system.

National Parking Garages, Inc., 120 South LaSalle St., Chicago, is acquiring lots in the business section of Milwaukee

for a \$1,000,000 storage garage, about 21 stories, 60 x 160 ft., equipped with automatic electric hoisting devices. W. W. Ahlschlager, 65 Huron Street, Chicago, is architect.

Badger Auto Body Co., 209 Hanover Street, Milwaukee, has appointed Hinkley Co., 5368 Greenfield Avenue, West Allis, Wis., engineer, to design a new one-story factory building, 80 x 237 ft., to cost about \$60,000.

National Lead Co., 52 Second Street, Milwaukee, will close bids this week for a one-story warehouse, 90 x 140 ft., to cost about \$50,000. Walter F. Marks is Milwaukee manager.

Wisconsin Grey Iron Foundry Co., Thirty-ninth Avenue and Burnham Street, Milwaukee, has awarded general contract for a two-story shop addition, 53 x 53 ft., to Martin Jezo, 597 Fifty-first Avenue, West Allis, Wis., to cost about \$10,000 without equipment.

W. J. Newman, 21 North Curtis Street, Chicago, has engaged Edward Tough, architect, Washington Street, Madison, Wis., to prepare plans for a \$50,000 airplane hangar at service station at Mirror Lake, Wis.

Marathon Rubber Products Co., Inc., Wausau, Wis., will take bids after middle of February for one-story addition, 86 x 121 ft.; foundations are in.

Otto Biefeld Co., Watertown, Wis., fabricator of structural steel and manufacturer of boilers and snow removal equipment, has plans for additions and has increased its capital stock from \$75,000 to \$100,000. Arthur Kuenzi, care of company, is architect.

George H. Smith Steel Casting Co., Milwaukee, has purchased a 21-acre site in south side manufacturing district and has plans for a new foundry for Trackson Co., its tractor equipment division. F. E. Hinners is president, and W. H. Stiemke vice-president of Smith company.

Joseph Miotke, tool and die maker, 259 Pittsburgh Avenue, Milwaukee, has been incorporated for \$25,000 under name of Joseph Miotke Tool & Die Co.

Business of Charles Malischke, 934 Thirtieth Street, Milwaukee, has been incorporated as Charles Malischke Co., to manufacture tools, dies, jigs and special machinery, with capital stock of \$50,000.

Cincinnati

CINCINNATI, Jan. 20.—Although the volume of fresh bookings of machine-tool builders dropped to a low point the past week, an unusual number of inquiries was received. Practically all manufacturers report that they are busy preparing estimates on inquiries, and should only a portion of the pending contracts be placed plants will be able to maintain production at a high rate well into the second quarter.

With the exception of the American Bridge Co.'s inquiry for nine radial drills, requests for quotations before the trade specify only a few machines each.

Schaible Foundry & Brass Works Co., Dane and Knowlton Streets, Cincinnati, is considering one-story addition, to cost about \$35,000 with equipment.

Welfare Department, State of Ohio, Ninth and Oak Streets, Columbus, has plans for power plant at State hospital at Longview, to cost \$240,000 with equipment. T. Ralph Ridley, Ohio Hartman Building, Columbus, is architect.

Rockwood Stove Works, Inc., Rock-

wood, Tenn., will carry out expansion and improvements to increase capacity about one-third, to cost over \$40,000 with equipment.

West Tennessee Power & Light Co., Ripley, Tenn., is planning expansion in power facilities, transmission lines and other development, to cost \$100,000 with equipment.

Board of Education, Louisville, is considering installation of manual training equipment in three-story high school to cost \$500,000, for which plans will be drawn by J. Meyrick Colley, Eighth and Chestnut Streets, architect for board.

Chattanooga Gas Co., Broad Street, Chattanooga, Tenn., is considering expansion and improvements in artificial gas plants and system, to cost \$200,000 with equipment.

Pre-Heat Furnace Corporation, Columbus, care of Willis E. Liggett, 85 East Gay Street, recently formed by Mr. Liggett and associates, plans operation of works for manufacture of furnaces and equipment. Orin Kelly, Columbus, is also interested in organization.

Gulf States Creosoting Co., Hattiesburg, Miss., plans works at Chattanooga, Tenn., including power house, pumping station, conveying and hauling equipment, etc., to cost over \$70,000. H. G. Fritchle, Slidell, La., is consulting engineer.

Board of Trustees, Soldiers and Sailors' Home, Columbus, has authorized new trades school building at institution at Xenia, to cost about \$85,000 with equipment. Architect will be selected soon.

Firestone Tire & Rubber Co., Akron, Ohio, will soon begin superstructure for factory branch, service and distributing building at Nashville, Tenn., to cost about \$200,000 with equipment. Marr & Holman, Stahlman Building, Nashville, are architects.

Stuebing-Cowan Co., Cincinnati, which recently became part of Yale & Towne Mfg. Co., Stamford, Conn., has completed its new plant at Winton Place, Cincinnati.

St. Louis

ST. LOUIS, Jan. 20.—Eagle Motor Truck Corporation, 6156 Bartner Street, St. Louis, has awarded general contract to E. H. DeLiniere Construction Co., 6522 Joseph Street, for one-story plant, 50 x 200 ft., at Valley Park, Mo., to cost over \$65,000 with equipment.

National Garage Co., 1308 Main Street, Kansas City, Mo., has plans for multi-story service, repair and garage building, to cost more than \$150,000 with equipment. G. E. McIntyre, Finance Building, is architect.

City Council, Blackwell, Okla., has authorized hangar with service and repair facilities at municipal airport, to cost about \$30,000 with equipment. Dwight Randall is city clerk.

Specialty Tool Corporation, 1229 East Twenty-ninth Street, Oklahoma City, Okla., recently organized by Roy Kink and associates, is planning early operation of local plant to manufacture tools and kindred mechanical equipment.

Board of Education, North Platte, Neb., is considering installation of manual training equipment in new three-story high school to cost \$300,000, for which bids will be received on general contract Jan. 27. Meginnis & Schaumberg, Federal Trust Building, Lincoln, Neb., are architects.

Gate City Iron Works, Inc., Eleventh Street and Seward Avenue, Omaha, Neb.,

has plans for one-story and basement shop, 110 x 160 ft., and one-story storage and distributing building, 32 x 105 ft.

Wood Brothers Co., Security Building, Kansas City, Mo., manufacturer of airplanes and parts, has plans for one-story plant at St. Joseph, Mo., to cost about \$65,000 with equipment. C. A. Smith, Finance Building, Kansas City, is architect. H. H. Denny is company engineer.

Union Electric Light & Power Co., 315 North Twelfth Boulevard, St. Louis, has begun work on hydroelectric generating plant on Osage River, near Bagnell, Mo., to cost more than \$3,500,000 with equipment. A transmission line will be built. Stone & Webster Engineering Corporation, Boston, is engineer. Company is a subsidiary of North American Co., 60 Broadway, New York.

Ethyl Gasoline Corporation, care of Argonaut Realty Co., General Motors Building, Detroit, has plans for a one and two-story storage and distributing plant, with laboratory, at North Kansas City, Mo., to cost over \$80,000 with equipment.

McGraw Electric Co., Omaha, Neb., has purchased fuse department of Westinghouse Electric & Mfg. Co., East Pittsburgh, including about 50 patents, and will consolidate with Bussman Mfg. Co., 2535 University Avenue, St. Louis, a subsidiary manufacturing electrical equipment. Last-noted company will expand facilities for fuse production.

O'Brien Equipment Co., 2726 Locust Boulevard, St. Louis, has been appointed distributor in the Missouri district for Mason Regulator Co., Boston.

Cleveland

CLEVELAND, Jan. 20.—Orders were light the past week and little inquiry came out. Sales were mostly for single machines. The Lycoming Mfg. Co., Williamsport, Pa., purchased five turret lathes from a Cleveland manufacturer, who also took a number of single machine orders. This company advanced its prices six to eight per cent on Jan. 15, and this brought out a number of orders on which quotations had been made earlier. Not much activity is looked for during the remainder of the month. Metal-working industries in this territory have increased operations since the first of the year, particularly manufacturers of automobile parts, but practically all are still operating at less than capacity and a few are in urgent need of additional machinery.

Hancock Mfg. Co., Cumberland, W. Va., manufacturer of steel blanks, has been purchased by Dave R. and George W. Jones, president and secretary-treasurer respectively, of Geometric Stamping Co., Cleveland, and associates.

Detroit Steel Products Co., Detroit, has purchased Holorib, Inc., 1515 Fairfield Avenue, Cleveland, manufacturer of steel roof deck. It is stated that the personnel of Holorib organization will remain unchanged.

Timms Spring Co., Elyria, Ohio, has completed a new plant, 60 x 200 ft., to replace one recently destroyed by fire. Company has 3000 sq. ft. more than in its old plant.

Rise Engineering Co., Columbiana, Ohio, recently formed by local interests, has secured property and will establish plant for manufacture of drilling engines, including parts production and assembling.

Sherwin-Williams Co., Canal Road,

Cleveland, is considering call for bids in about 60 days for one-story addition to local paint and varnish plant, for iron oxide production, to cost more than \$100,000 with equipment. Company is also contemplating another extension for a linseed oil mill, including press and other departments, to cost about \$80,000.

Nash-Ohio Engine Co., Alliance, Ohio, recently organized, has leased space in part of plant of Morgan Engineering Co., for production of a Diesel-type motor, including parts and assembling.

General Fireproofing Co., Youngstown, Ohio, manufacturer of steel office furniture and equipment, is arranging to rebuild five-story factory branch, storage and distributing plant at Chicago, recently destroyed by fire.

Lakewood Stamping & Mfg. Co., Lakewood, Ohio, recently incorporated, has equipped a plant at 13000 Athens Avenue for the manufacture of metal stampings. J. B. Hope is president.

Detroit

DETROIT, Jan. 20.—Metalcraft Heater Corporation, 13 McConnell Street, Grand Rapids, is considering one-story addition, to cost about \$30,000 with equipment.

Saginaw Pure Ice Co., Saginaw, has authorized rebuilding part of artificial ice plant recently destroyed by fire, to cost over \$50,000 with machinery.

Federal Steel Corporation, 126 South Artillery Street, Detroit, is considering expansion and improvements to double present capacity, to cost more than \$80,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in new plant to be constructed by General Baking Co., 420 Lexington Avenue, New York, at Detroit, to cost about \$1,000,000. J. E. Byrne is company superintendent of construction, New York headquarters.

Durant Motors, Inc., Lansing, is considering expansion and installation of additional equipment. It is proposed to remove engineering department to that location and increase production. Entire project will cost over \$100,000 with equipment. Ralph A. Vail is vice-president in charge of production.

Johnston Motor Sales Co., 711 North Saginaw Street, Flint, has plans for two-story service, repair and garage building to cost about \$100,000 with equipment. MacKenzie & Pratt, Citizens' Bank Building, are architects.

Detroit Edison Co., 2000 Second Avenue, Detroit, is arranging for expansion and improvements to cost about \$27,000,000, of which about \$7,000,000 will be expended for new electric generating plants and additions to present stations; \$7,700,000 for new power substations at Detroit and other places; \$2,900,000 for hydraulic plants, heating system, gas plant at Port Huron, and other work; \$3,600,000 for extensions in distributing lines and service connections; and \$3,400,000 for underground conduits and cables. Company engineering department, address noted, is in charge.

Department of Street Railways, 735 Randolph Street, Detroit, D. A. Smith, general manager, is planning one-story car barn, with service, inspection and reconditioning facilities at Dearborn, with power plant on adjoining site, to cost about \$200,000 with equipment.

Board of Education, Benton Harbor, is considering installation of manual training equipment in new junior high school, to cost more than \$150,000 with equipment.

Warren Holmes Co., Lansing, is architect.

Ethyl Gasoline Corporation, 723 East Milwaukee Avenue, Detroit, has plans for a one and two-story plant and laboratory on St. Antoine Street, to cost over \$65,000 with equipment.

Oakland County Board of Commissioners, Annex Court House, Pontiac, has awarded general contract to Pryale Construction Co., Riker Building, for power plant on Cooley Lake Road, about seven miles from city, to cost about \$90,000 with machinery.

Indiana

INDIANAPOLIS, Jan. 20.—Getz Motor Co., 715 Fulton Street, Fort Wayne, has plans for a three-story addition to service, repair and garage building, to cost about \$100,000 with equipment. Charles R. Weatherhogg, 250 West Wayne Street, is architect.

Inland Box Corporation, 700 West Morris Street, Indianapolis, manufacturer of corrugated fiber box and containers, has purchased Gardner-Harvey Container Co., Middletown, Ohio, and will consolidate. New company has been formed under name of Inland Container Corporation, and plans are under way for expansion in both plants. Corrugating machines will be installed. H. C. Krannert, heretofore head of Inland company, will be president and treasurer of consolidated organization; E. T. Gardner, previously president of Gardner-Harvey company, will be vice-president.

Municipal Power Department, Richmond, is planning extensions and improvements in municipal electric light and power plant, including installation of additional machinery, to cost over \$300,000. D. C. Hess, 32 South Eighth Street, is general superintendent.

Servel, Inc., Evansville, manufacturer of electric and gas-operated refrigerating equipment, is contemplating an addition to cost more than \$50,000 with equipment. Headquarters are at 51 East Forty-second Street, New York.

Gulf States

BIRMINGHAM, Jan. 20.—Texas Power & Light Co., Dallas, Tex., will soon begin construction of addition to steam-operated electric power plant at Trinidad, Tex., to include installation of 40,000-kw. turbo-generator unit, high-pressure boilers and auxiliary equipment, to cost over \$500,000 with steel tower transmission system. Later, capacity will be increased with two additional turbo-generators of size noted.

Sampson Iron & Metal Co., 1047 Crockett Street, Beaumont, Tex., has plans for a one-story storage and distributing plant, 60 x 100 ft., to cost about \$35,000 with equipment.

Coale Roofing & Distributing Co., Beaumont, Tex., recently organized as a subsidiary of Coale Lumber Co., same place, is arranging for establishment of plant to manufacture roofing, etc. Company is capitalized at \$150,000.

Stockholm Pipe & Fitting Co., 4100 Thirteenth Avenue, North, Birmingham, has filed plans for a one-story storage and distributing plant, 60 x 160 ft., to cost over \$50,000 with equipment.

Lamson & Sessions Bolt Co., 3103 Twenty-seventh Avenue, Birmingham, has awarded general contract to Johnson Construction Co., Martin Building, Birmingham, for one-story addition, 100 x 240

ft., to cost over \$100,000 with equipment. George S. Rider Co., Century Building, Cleveland, is engineer.

Magnolia Petroleum Co., Dallas, Tex., a subsidiary of Standard Oil Co. of New York, 26 Broadway, New York, has begun work on new steam-operated electric power plant at Beaumont, Tex., for service at local oil refinery, to cost more than \$100,000 with equipment.

Arch Engineering & Construction Co., Inc., Exchange Building, Orlando, Fla., recently organized, has plans for one-story steel fabricating plant, including division for welding structural shapes, etc.

Lufkin Foundry & Machine Co., Lufkin, Tex., has plans for one-story addition for mechanical cleaning and other service, to cost more than \$65,000 with equipment. Company recently increased capital from \$50,000 to \$150,000.

Ovens, power equipment, conveying and other machinery will be installed in two-story plant to be erected by Fisher Hotshop Bakery, Inc., Waco, Tex., to cost about \$125,000. Roy E. Lane, Waco, is architect.

International Harvester Co., 606 South Michigan Avenue, Chicago, has awarded general contract to Kucharo Construction Co., Des Moines, Iowa, for two-story and basement factory branch and distributing plant, 90 x 250 ft., at San Antonio, Tex., to cost about \$100,000 with equipment. W. D. Price is company superintendent of construction, Chicago.

J. W. Killingsworth, Love Field, Dallas, Tex., formerly connected with Fairchild Corporation, operating an air line, has taken over a local hangar heretofore used by Southern Air Transport, Inc., and will convert for a machine and repair shop.

Board of Education, El Paso, Tex., plans installation of manual training equipment in new two-story and basement high school to cost about \$280,000, for which bids are being received on general contract. Braunto & McGhee, First National Bank Building, are architects.

Gulf Steel Supply Co., 937 Pine Street, Beaumont, Tex., has recently been chartered to deal in new and second-hand pipe, oil well supplies, iron, steel and metals.

Pacific Coast

SAN FRANCISCO, Jan. 16.—Great Western Power Co., 530 Bush Street, San Francisco, and San Joaquin Light & Power Corporation, Fresno, Cal., affiliated organizations, are arranging for expansion and improvements to cost about \$21,000,000, including additional power facilities, transmission lines, hydroelectric power station development and other work.

Wheeler-Osgood Co., Tacoma, Wash., manufacturer of sash, doors and other millwork products, has plans for a two-story branch plant at Los Angeles, 100 x 270 ft., to cost about \$100,000 with machinery. John M. Cooper, Rives-Strong Building, Los Angeles, is architect.

Feather River Power Co., 530 Bush Street, San Francisco, will proceed with a hydroelectric power development on Feather River in Plumas County, to cost over \$5,000,000 with steel tower transmission system.

Sunset Oil Co. of California, Liggett Building, Seattle, is planning new storage and distributing plant at Everett, Wash., to cost over \$40,000 with equipment.

Crane Co., Los Angeles, has awarded general contract to Harvey A. Nichols,

936 East Slauson Avenue, for one-story pipe shop and shed, 80 x 400 ft., to cost about \$75,000 with equipment, latter to include an electric traveling crane. Headquarters of company are at 836 South Michigan Avenue, Chicago. Morgan, Walls & Clements, Van Nuys Building, Los Angeles, are architects.

Producers' Oil Co., Fresno, Cal., Stanley R. Pratt, head, is planning for a cottonseed oil mill in San Joaquin Valley district, to cost about \$100,000 with equipment.

Master Service Co., Los Angeles, has plans for a two-story and basement automobile service, repair and garage building, 130 x 210 ft., at West Los Angeles, to cost about \$125,000 with equipment. Westwood Mortgage & Investment Co., West Los Angeles, is architect.

Southern Sierras Power Co., Riverside, Cal., will carry out an expansion and improvement program in Imperial Valley section, including extensions in power facilities and transmission lines, etc., to cost about \$140,000 with machinery.

Worthington Pump & Machinery Corporation, 2 Park Avenue, New York, has organized Worthington Machinery Corporation of California, Ltd., as Pacific Coast subsidiary, with headquarters at Los Angeles and San Francisco, which will hereafter handle all business on the West Coast. H. D. Cornell, who has been president of Worthington Machinery Corporation of Oklahoma, will be president of the new California corporation. George W. Hawkins, who has been director of sales of Worthington Pump & Machinery Corporation, is vice-president of Pacific Coast unit.

Southern Electric Works, Inc., 1167 East Sixty-third Street, Los Angeles, has been organized to serve iron, steel and alloys industries in application of electric furnaces to melting of metal. Robert J. Hanchett is president, Thomas V. Cassidy, vice-president, and E. B. Morgan, secretary-treasurer.

Menasco Motors, Inc., Los Angeles, contemplates an output of 250 airplane engines this year. Company's production last year was 10 engines.

Foreign

A COMPANY has been formed by Aaron Saenz, Governor of Monterey, Mexico, and associates, to construct and operate a cane sugar mill near Villa Juarez, Rio Mante Valley, and general building contract has been let to Monterey Iron & Steel Co., Monterey, for initial units, to have an annual capacity of 35,000 tons of refined sugar. It is understood that contract for certain machinery has been awarded to Fulton Iron Works Co., St. Louis; awards for other equipment will be placed soon. Entire project will cost about 5,000,000 pesos (\$2,500,000). Later it is proposed to build an alcohol distillery as an auxiliary unit. J. A. Chadbrand, Monterey, operating sugar cane plantations, will be an official of new company.

Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, is considering construction of new refinery at Point Jerome on Seine River, near Havre, France, where a large tract has been secured. Permission has been asked of French Government for formation of cooperative company of American interests and for authority to proceed with project which will cost more than \$4,000,000 with equipment. Other companies said to be identified with joint organization now being chartered, include Gulf Oil Corpora-

tion, Frick Annex, Pittsburgh, and Atlantic Refining Co., 260 South Broad Street, Philadelphia.

Fiat Co., Turin, Italy, manufacturer of automobiles, has acquired Italia Automobile Co., with local plant, capitalized at 35,000,000 lire (about \$1,800,000) and will continue operation as a subsidiary. Purchasing company is arranging for expansion to include production of automobiles from low to high-priced cars. A financial syndicate is being organized by officials of company to secure an interest in and develop a number of small motor-car plants in different parts of country, including technical facilities to modernize such factories for quantity output.

Secretary of Public Works, Supplies and Tenders, Wellington, New Zealand, is asking bids until April 29 for electrical equipment, including transformers of 34,000-kva. capacity; synchronous condenser, 10,000 kva.; and switch gear for water rheostats, 11,000 kva., etc.

Norton Co., Worcester, Mass., will establish a plant in England to manufacture Norton grinding wheels and associated products. It now operates branch plants at Wesseling, Germany; Hamilton, Ont., and LeBourget, France. British plant will be located at Welwyn, Garden City, Hertfordshire, about 20 miles from London.

Canada

TORONTO, Jan. 20.—A stronger demand for machine tools has developed in this market. In addition to more extensive purchases for replacement, dealers and builders state that lists for new works and extensions are coming out in larger number. Some good orders have been closed for the mining fields and others are in prospect.

E. B. Eddy Co., Ltd., Bridge Street, Hull, Que., has plans for new paper mill to cost \$1,000,000, on which construction will be started soon. Victor Drury, 360 St. James Street, Montreal, is president.

B. Greening Wire Co., Queen Street North, Hamilton, Ont., has awarded several contracts and will proceed with erection of an addition on Napier Street.

Chrysler Machine Works, 23 Taylor Avenue, St. Catharines, Ont., has awarded contracts for a one-story machine shop. Equipment has not been purchased.

Work will start immediately on repairs and addition to factory of J. A. Wilson Co., Ltd., 9 Morrison Street, Toronto, manufacturer of electric fixtures, etc.

City Council, Hamilton, Ont., contemplates building a machine shop to cost \$50,000. S. H. Kent is clerk, and W. L. McFaul, engineer.

Western Canada

C. Gordon, Vegreville, Alta., will start work about April 1 on a two-story factory to manufacture building specialties, etc., to cost \$50,000.

Steel Containers, Ltd., will start work immediately on a plant on Granville Island, Vancouver, B. C., for the manufacture of steel gasoline drums, etc. C. D. Hobbs is managing director.

New Trade Publications

Pressed Metal Parts.—Geuder, Paeschke & Frey Co., Milwaukee. Booklet of 16 pages, illustrating and describing a wide variety of uses for pressed metal in many industries, with a comparative table of thicknesses of

various sheet metals and their respective gages.

Plugs and Receptacles.—Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2203, illustrates and describes in four pages a variety of plugs and conduit receptacles for high-frequency electric tools.

Switch Condulet.—Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2204 of two pages illustrates and describes type FSQ interlocking safety switch condulet, for use with small portable electrical appliances, especially in locations where dust and gases are present.

Multiple-Retort Stoker.—Combustion Engineering Corporation, 200 Madison Avenue, New York. Catalog MR-2 of 47 pages, illustrating and describing C-E multiple-retort stoker, which burns practically all grades of bituminous coal. Photographs showing tained in the bulletin, with a number of sectional drawings of various boiler both details and installations are con-

texrope Drives.—Allis-Chalmers Mfg. Co., Milwaukee. Bulletin 1228-K of 28 pages illustrates and describes the application of texrope drives to many industries. It is stated that over 70,000 texrope drives have been put in service in the past four years, and that a gain of 48 per cent was made in 1929, over 1928.

Lock Nuts.—Interlock Nut & Bolt Co., 1836 Euclid Avenue, Cleveland. Catalog of 16 pages describes and illustrates a combination of bolt, washer and nut, forming an interlocking nut. The bolt has two parallel, opposite, long grooves. Two inner lugs of a cupped washer fit these grooves. After the nut is in place the outer rim of the washer is upset into a chuck on the lower and outer face of the nut, permanently locking the nut on the bolt.

Woven Wire Screens.—The Ludlow-Saylor Wire Co. A four-page leaflet describes the "Arch-Crimp" woven wire screens for coarse sizing. This is described as an entirely new development in weaving wire screens with large openings. It is also stated to be a great advance over the old style of intermediate crimp screen.

Electric Fans.—Wagner Electric Corporation, St. Louis. Bulletin 166 of 10 pages, illustrated, discusses in detail the advantages of installing furnace fans in the cold-air intakes of warm-air furnaces.

Pulverized Coal Equipment.—Kennedy-Van Saun Mfg. & Engineering Corporation, 2 Park Avenue, New York. Folder of four pages, illustrated, entitled "Black Stone," written in the form of a story concerning the early mining of fuel.

Bent-Tube Boilers.—Combustion Engineering Corporation, 200 Madison Avenue, New York. Bulletin BVM1, 8 pages, illustrates and describes the V-M type boiler, designed especially for limited space, particularly where head-room is low. The folder contains table of dimensions and drawings showing setting dimensions required for various sizes.

Air Compressors and Motors.—Busch-Sulzer Brothers Diesel Engine Co., St. Louis. Four-page folder, illustrating and describing various types of air compressors and Diesel cylinders, both stationary types and those for use in ships, etc.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

INDUSTRIAL activity generally is marked by extreme caution, and gaged strictly by orders in hand. An index of business activity prepared by *Annalist*, which stood at 108.5 in July, dropped from 103.5 in October to 94.2 in November and 90.1 in December. Year-end declines were sharpest in the automobile industry, iron and steel next. Freight car loadings, however, were about the same for the last two months.

* * * * *

WHOLESALE commodity price index at 139.8 is the lowest in five years. Declines in all classes except fuel occurred last week. Coffee has sold at such a low level that retail prices have been reduced 5 to 10c. per lb.

* * * * *

AUTOMOBILE, tire and parts manufacturers have increased their production schedules . . . Dealers who will sell the "baby Austin" motor cars place orders for 52,000 at a private showing of this American-made car of a design very popular in England . . . The International Labor Office of the League of Nations commences a study of the expenditures of 100 \$7-a-day Ford workers in Detroit, in order to determine the equivalent in real wages in 13 European centers where there are Ford factories.

* * * * *

BANK clearings last week were 22 per cent lower than a year ago . . . Credit is ample to meet all worthy demands, in the opinion of J. G. Lonsdale, president American Bankers' Association . . . Banks in the major cities generally report large profits from 1929 operations . . . There seems to be a minor epidemic of bank failures in small towns in the North Central States.

* * * * *

RAILROAD car loadings in the first quarter of 1930 will be slightly larger than in 1929, according to estimates made by the American Railroad Association. Decreases expected in steel, automobiles and building materials will be more than counterbalanced by increases in food-stuffs and fuel . . . Railroads in 1929 established records in freight car mileage per car-day, weight per train, and fuel economy . . . Daniel Willard, president Baltimore & Ohio Railroad Co., was given a testimonial by 1600 union employees for promoting cooperation between managers and men, based on mutual confidence . . . Northern Pacific Railway was authorized to build 150 miles of line through the timber on Olympic Peninsula, Washington . . . New Haven railroad and subsidiaries were valued at \$256,400,000 for rate-making purposes (compare with \$373,860,000 outstanding securities). The company claimed a value at least \$100,000,000 higher . . . A 6-year program to reconstruct the Australian State railroads to a standard gage, at a cost

of \$150,000,000, is adopted by the Commonwealth Government.

* * * * *

PUBLIC works (construction and maintenance) will absorb the record sum of \$3,250,000,000 in 1930, according to Secretary of Commerce Lamont. Public utilities will expend an equal amount for plant, equipment and improvements . . . Work was started on an 80,000-hp. hydroelectric station on the Columbia River near Wenatchee, Wash.

* * * * *

GREAT BRITAIN, Germany, Holland, Japan and United States (in the order named) built the most ships last year. American yards start 1930, however, with twice as much business on their books as a year ago . . . To reduce the construction costs in the United States, a committee of shippers recommends standardization of three types of ocean-going vessels . . . International Mercantile Marine, operating 51 ships totalling 470,000 tons, resumes dividends, passed for several years.

* * * * *

CRUDE oil production oscillates about a figure of 2,650,000 bbl. weekly, despite efforts to restrict flow . . . Prices for Texas and Mid-Continent petroleum have been reduced about 25 per cent, the present prices ranging from \$0.66 to \$1.44, depending on its gravity . . . Fifty towns, along the route of the new natural gas lines between Louisiana and St. Louis and Atlanta, Ga., are being piped for gas service.

* * * * *

MAYOR THOMPSON of Chicago has twice vetoed the city's economy budget; meanwhile about 25,000 employees' wages are unpaid.

* * * * *

GROUP insurance, including life, accident and pension, has been taken out by Altoona, Pa., for all employees. It costs about 2 per cent of the wages received, and the city pays a similar amount . . . In conjunction with the census, the American Federation of Labor will gather statistics on unemployment and its causes . . . Attempting to organize the shops making highest grade women's wear, the Dressmakers Union is enrolling "cooperators"—workers sympathetic with the aims of the union but not wishing to become full-fledged members.

* * * * *

NAVAL conference meets in London . . . Premier MacDonald has informed France that enough nations have renounced war as an instrument of national policy to justify a reduction in armaments without waiting for "sanctions" to "enforce" peace. He also is in favor of postponing replacement dates on battleships, and their eventual abolition, leaving the 10,000-ton cruiser as the largest war vessel.

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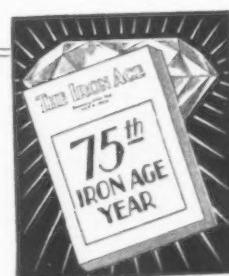
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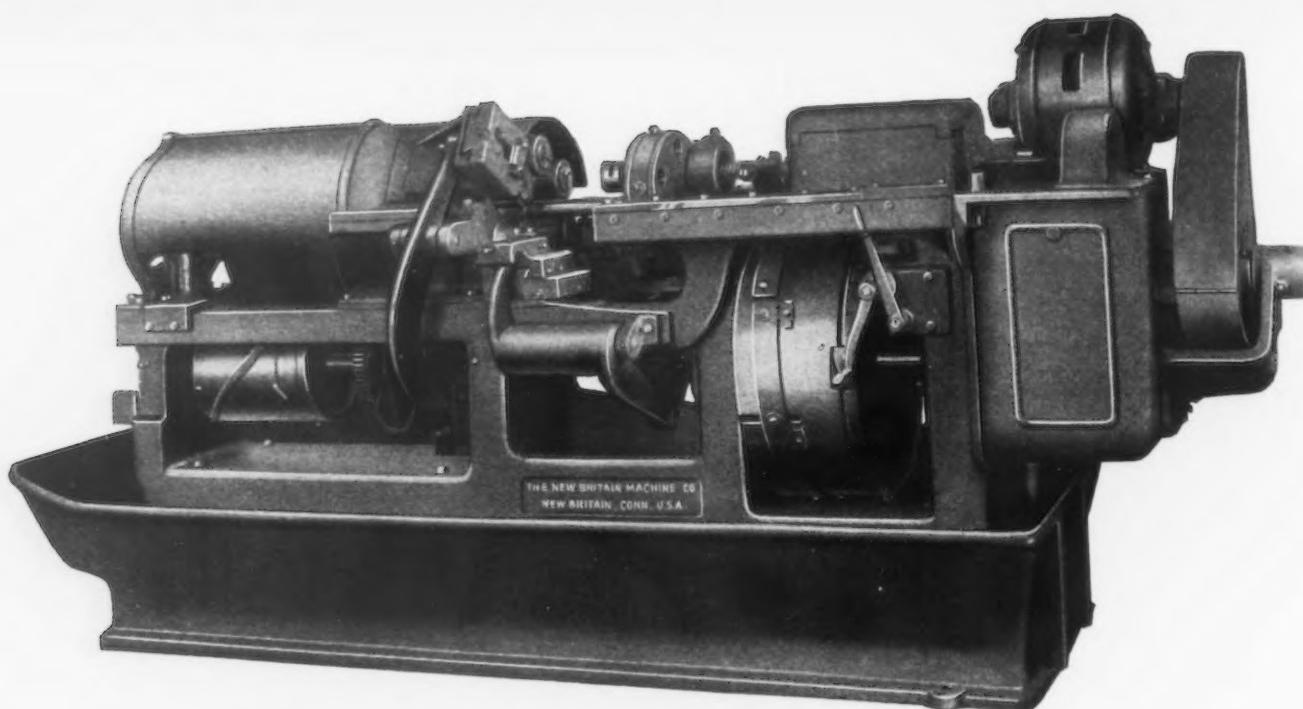
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The history of progress in American manufacturing is paralleled with the development and productive capacities of New Britain Automatics. Every demand made by industry has been anticipated by the engineers of this company and reflected in the machines built.

The machine illustrated above is our Six Spindle Screw Machine made in four sizes—i.e.— $5\frac{1}{8}$ ", 1", $1\frac{5}{8}$ " and $1\frac{3}{4}$ ". The splitting of long operations with consequent increased production is made possible through six end and four or five cross slide positions available on these machines. Advance design, free access to tools, ample chip space are features aiding constant production.

THE NEW BRITAIN-GRIDLEY MACHINE CO. NEW BRITAIN, CONN.

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THE IRON AGE

New York, January 30, 1930

ESTABLISHED 1855

VOL. 125, No. 5

Electric Heat-Treating Furnaces

Types Now in Use for Steel and Non-Ferrous Products—
Problems of Their Design—Large Tonnages
and Products Handled

BY A. H. VAUGHAN*

TO one engaged in the design of heat-treating equipment there are few fields which present more varied problems or engage the interest of the engineer so intensely. This is true because of the many opportunities yet existing for improvement of heat-treating processes and equipment and because of the many sources of technical information which must be turned to use in solving the problems which are met.

Much Technical Data Necessary

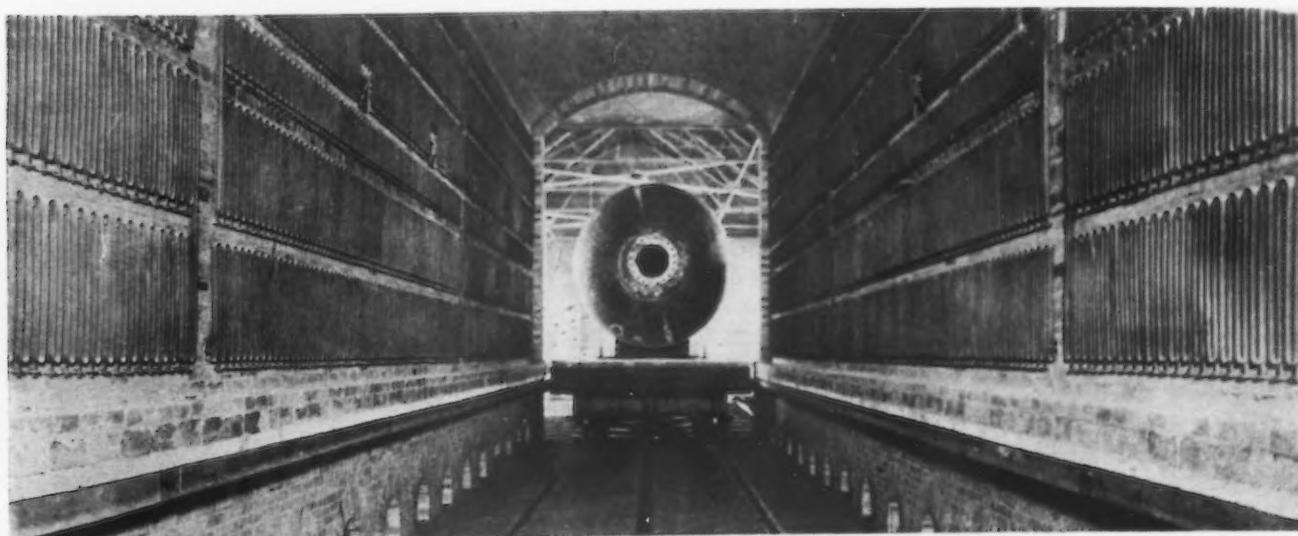
We believe that the special field of electric furnace design is the most interesting in the realm of heat-treating equipment. Its advancement has been, and still is, very rapid with little prospect of the job ever becoming monotonous. The field is perhaps primarily mechanical engineering in that furnace design involves the application and conservation of heat and the design of structures and me-

chanical apparatus. There are also many electrical problems, not alone in the simple matter of generating heat by electrical resistance, but in the economical application of power, the improvement of factory power loads, and to a very large degree in the intelligent use of automatic electrical apparatus in connection with complex mechanical handling problems.

Adaptable to Large Tonnages

We are finding electric furnaces adaptable to large tonnage operations and fully as capable as any other equipment to stand the abuse of steel mill service. The fact is that we can handle furnaces of a size which, to the best of our belief, could not possibly be built in combustion types. It is just as easy for us to distribute heat accurately over an area of 2000 sq. ft. as it is in a laboratory furnace with a hearth of 1 sq. ft. We are able to maintain uniformity in the lower temperature ranges where heat distribution is especially difficult with combustion heating.

We are putting mechanical handling apparatus inside



Interior View of 3000-Kw. Car-Type Furnace Handling Welded Steel Pressure Vessels Weighing Up to 150 Tons Each. This furnace is over 65 ft. long inside

the furnace, as well as outside, to an extent which we, ourselves, would not have believed possible five years ago. We are finding improved methods of design and improved methods of applying heat so that the supposed disadvantage of slow heating in the electric furnace in many cases no longer exists.

Advantages of a Continuous Furnace

Early electric furnace design was largely confined to box and car types. The rotary and some small pusher furnaces were about the only exceptions. However, there are

many points of inferiority to which the batch type furnace is subject and which the continuous furnace avoids. One of these disadvantages is the difficulty of attaining a satisfactory heating speed. It is easy to realize that the absorption of heat by a cold load of material is very rapid, but that the absorption rate decreases greatly as the temperature of the work rises. This means that the batch type furnace has to be powered high enough to supply heat as near as possible at the initial absorption rate. Then, as the absorption rate decreases, we make only partial use of the power available. In a continuous furnace, on the other hand, every zone continually does the same part of the heating and can always operate close to 100 per cent of capacity.

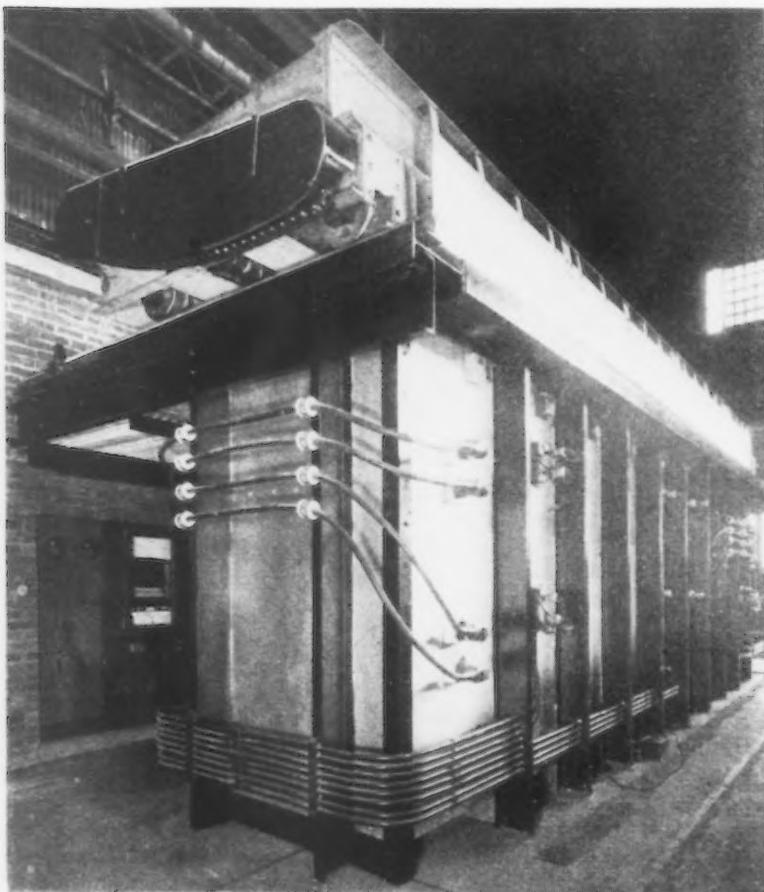
Realizing the desirability of continuous handling, we have tried a great many types of mechanisms for the various classes of work which logically should be so handled. Some of these have not met expectations, but in the main we are now able to furnish automatic or semi-automatic continuous equipment wherever it is really needed. Even in the cases where the process is best handled by batch type equipment, we have done much in the improvement of handling machinery and the adaptation of furnaces to the most desirable temperature cycles.

Very Large Furnaces Possible

The size of electric furnaces has grown to such an extent that our organization has built several furnaces of 1000 kw. or over, including one of 3000 kw. We see 10,000 kw. in prospect, if such a size is needed.

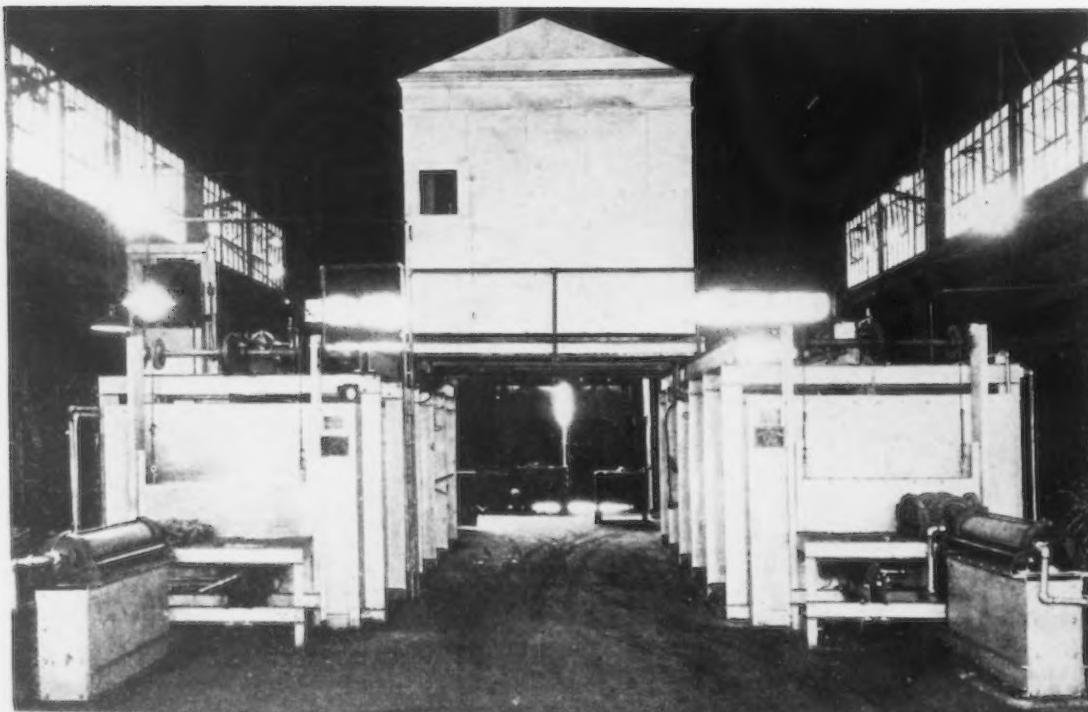
The heat treatment of rough forgings is a field which uses a large amount of heating capacity, especially in motor car plants. The earliest large installation for this work was at Dodge Brothers and it still is a noteworthy one. It consists of 32 double end box type furnaces and five pusher furnaces with a total rating of about 6500 kw. The heating capacity is, roughly, 30 tons per hr.

The use of box type furnaces was here de-



PIT Furnace
with Motor-
Driven Lifting and
Rolling Cover
(Above)

RETURN or
Counterflow
Recuperative Furnaces Annealing
Gear Forgings (At
Right)



termined by the extreme variety both of material and treatment. All kinds of forgings from axles and crankshafts to valves are handled. Some of the work involves quenching and drawing, some only annealing.

Counterflow Units Produce Good Results

In annealing work we have applied a great many furnaces of the counterflow recuperative type with good results. This type of furnace saves power by recovering part of the heat in finished material by radiation to preheat additional stock. The power consumption is about half that of a non-recuperative unit of the same size. It has further advantages of excellent uniformity and convenient handling. We have built recuperative furnaces for annealing gear blanks, engine cylinders, cast iron parts, brass and copper as well as miscellaneous forgings.

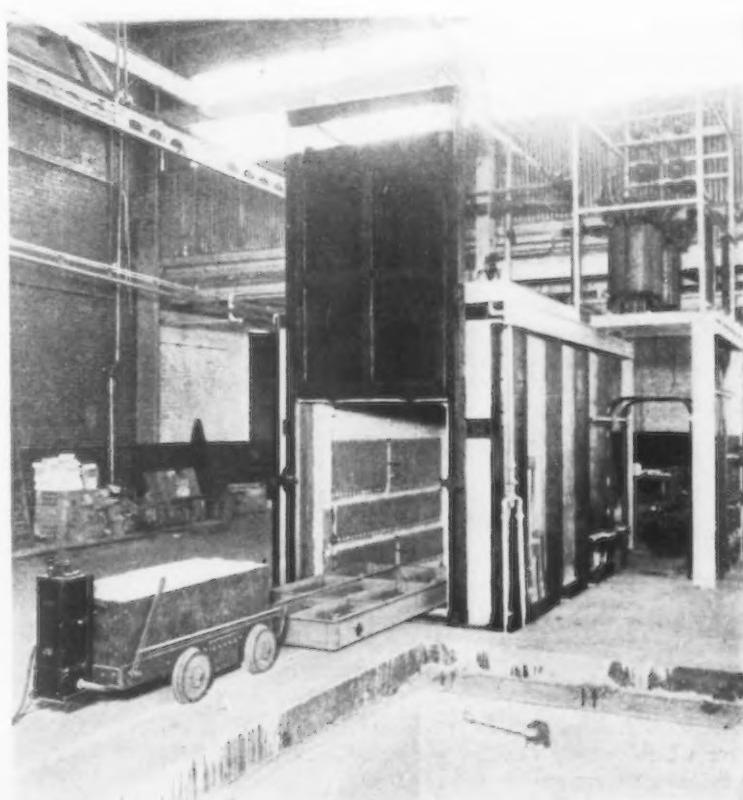
The recuperative furnace, of course, gives relatively slow heating and a cooling rate considerably below normal air cooling. Special-cycle normalizing treatments therefore cannot be so handled. The exact structure desired for high-speed gear cutting can only be secured by a cycle consisting of heating rapidly to 1650 deg. Fahr., soaking to equalize temperature, cooling rapidly to 300 to 400 deg. Fahr., holding to equalize temperature and cooling slowly to black.

To meet this cycle, we have developed a pusher type furnace with a large number of separately controlled zones, each powered as necessary for its part of the cycle. The rapid cooling is done in a zone with controlled air blast through metal cooling ducts in the furnace.

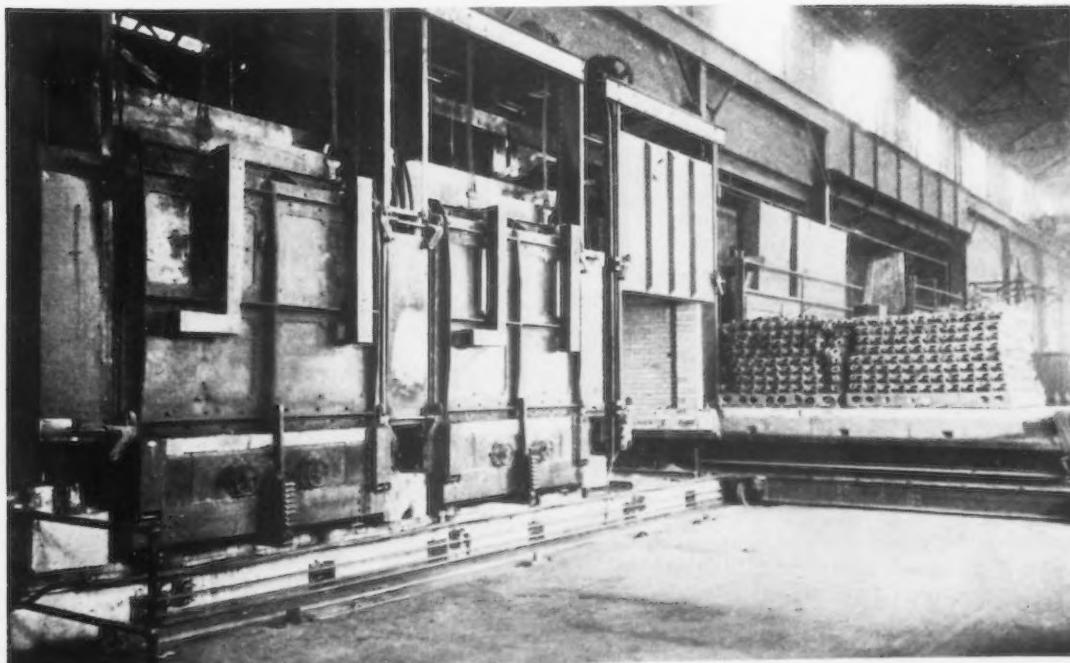
Nowadays, most quantity carburizing is done in continuous furnaces. There are a few rotaries and non-recuperative pusher furnaces used especially where quenching from the boxes is desired. By far the largest part, however, is done in recuperative furnaces in which, as in annealing, the heat recovery saves about half of the power. They produce uniform work and the case is more easily controlled than would be expected in a continuous furnace. Once a cycle has been determined, there is little opportunity for erratic results.

By using different speeds of travel in the two directions, it is possible to get two different depths in each chamber. Two or more chambers, therefore, will take care of as many classes of work as any plant is likely to have.

The heat treatment of finished parts is a field which needs a much different class of equipment. The units, for instance, are usually much smaller, and as for accuracy, a closer control is desirable. One treatment in this class is now done almost universally in a single type of furnace. This is the hardening of ring gears, which is done in the roller hearth furnace. The furnaces are usually small, mostly under 75 kw. per chamber. They have the advantages that the gears are heated with maximum rapidity and very little distortion and that they are easily handled from furnace to quenching machine. We have varied from customary practice in building this fur-



SPECIAL Truck-Type Furnace for Heat Treating Aluminum Alloy Castings and Forgings (Above)



THREE Chamber Steel Foundry Annealing Furnace with Motor-Driven Transfer and Car Puller. Cooling chamber shown open (At Left)

nace double-decked to save floor space and allow close grouping of quenching machines.

Conveyor Furnaces Difficult to Build

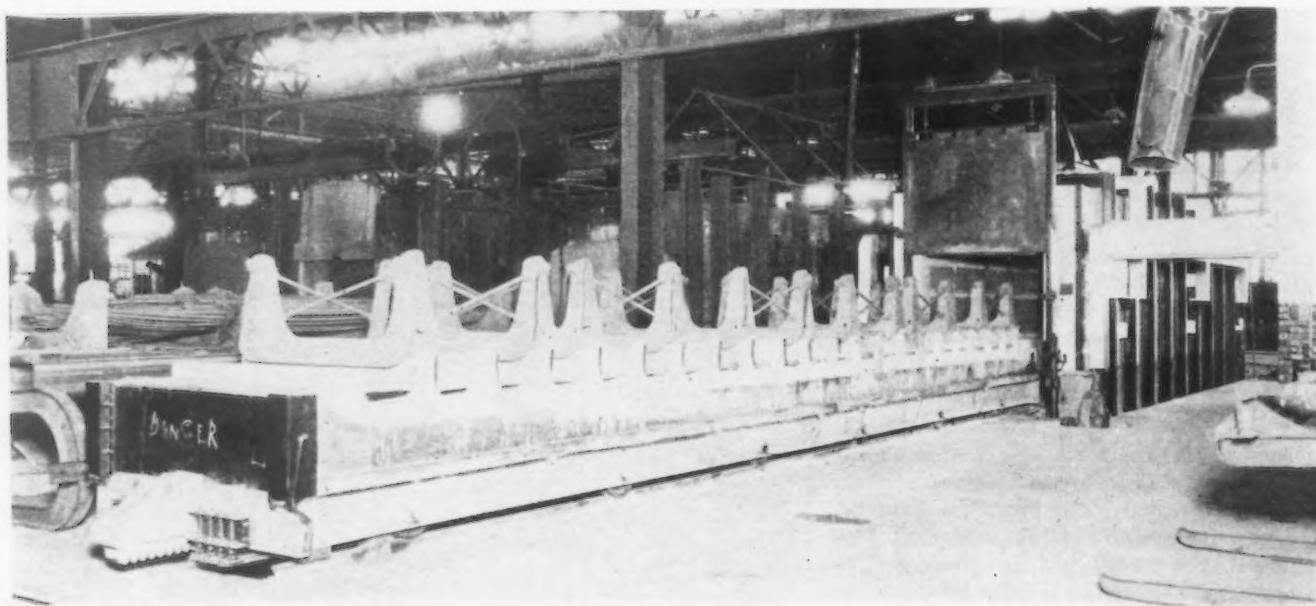
Every furnace engineer knew years ago that a conveyor type furnace was needed but he did not know how to build it. The difficulties are very apparent. Economy of power is the first of these. Even if we could afford to pay for heating a heavy conveyor each time it passed through the furnace, the resulting slow heating speed would be fatal. Furthermore, what kind of conveyor design could stand up long in a furnace, continually subject to thermal shock and heavy mechanical stress?

The answer to the economy problem is to keep the chain inside without any chance to cool. This helps the heating speed and makes the furnace faster than any other type we know of for light and medium work. The

is 70 to 100 hr. with a part of the cooling at a controlled rate. These furnaces are 9 ft. wide by 21 ft. long and 6½ ft. deep. They take an average charge of about 100,000 lb. each. The covers were found to be too heavy to handle with the annealing shop cranes and we were forced to design a special traveler or gantry crane of 30-ton capacity to manipulate them. One crane serves several furnaces, which are placed in line.

The normal cooling speed is slow on account of the large size of furnace and charge. We installed apparatus for accelerated cooling with air blast through cooling pipes within the furnace. This has the added advantage of shortening the time of a heat as well as giving the desired temperature cycle.

We have built other large pit furnaces with motor-driven rolling covers in cases where the chamber is narrow. These are used for bearing steels where uniform



Special Car Type Annealing Furnace with Cradles for Handling Tubes

solution of the mechanical problems is to make a conveyor which is very flexible, yet light, and which will not be injured by expansion stresses.

The familiar rotary is still best for gears of some classes especially where furnace heating is followed by a short cyanide dip before quenching. An example of a special process which falls in no particular class is a special rotary used for brazing together the flange and body of a pressed steel wheel hub. Such special units form a substantial part of our work, though their limited use is an objection to the builder.

With a few exceptions, continuous processes do not fit well in the steel foundry. Here, where castings are received in lots and usually are of all sizes and shapes, we have had to retain the car type furnace. The use of motor propelled cars and car transfers, and quenching machinery for box type furnaces is an example of improved handling and controlled cooling in the furnace, or a separate chamber has made possible a better treatment.

Large Size Furnaces

The types we have built for steel mill service illustrate the possibility of large size electric furnaces. For annealing of alloy steel bars and tubes, the large pit type furnace has advantages of great capacity, good temperature distribution, and minimum power consumption.

We have five pit furnaces, each of 850 kw. rating in annealing service in one alloy steel mill. They are mostly used for high-carbon chromium-bearing steels. The cycle

high speed of heating is desired, and for heating large heavy plates for rolling. In smaller sizes, the covers may be handled satisfactorily by the shop cranes.

For normalizing bars we developed about three years ago a continuous unit which we have since built in 700 and 1000 kw. sizes, capable of handling about 7000 and 10,000 lb. per hr. at 1600 deg. Fahr. In these the bars are received at one side of the chamber, travel broadside on shoes until they reach the other wall at the desired temperature. They are then ejected lengthwise to a cooling bed by a pusher bar. These furnaces are very fast, produce uniform results and, because of large output for their size, are very efficient.

We have also built several car furnaces for bars and tubes. By using cradles on the car the handling is much simplified. Such furnaces can be used for somewhat wider variety of work than a continuous type.

Only Electricity for Aluminum Alloys

Heat treatment of strong aluminum alloys is the most notable example of a process where electric heat is the only solution. The temperatures are under 1000 deg. Fahr. yet only a few degrees below the point where the alloys would be ruined by overheating. Accuracy is very important because the maximum properties are developed by the metal within a range of about 10 deg. Fahr.

For general service in this work we have built a number of round pit furnaces, 5 or 6 ft. in diameter and 3 to 12 ft. deep. They are quite free from cold spots, have

very low heat loss, and because of the temperature, racks or baskets serve very well for handling. They lend themselves especially well to the heating of long articles such as propeller blades, which can be suspended vertically with no danger of distortion.

In large sizes we have built a number of box type furnaces with structural steel cars that run entirely inside the chamber. We also have used one semi-continuous furnace with rectangular baskets carried on live rollers and a hydraulic lowering platform for quenching.

Largest Furnace Ever Built

To the best of our information the largest electric heat-treating furnace in use is one we built some time ago for annealing welded pressure vessels. These may be up to 10 ft. in diameter and 60 ft. long and weigh up to 150

tons. It is rated at 3000 kw., car type, and its construction involved some entirely new problems in mechanical design and in heat distribution.

We find that many methods we have perfected are being adopted in combustion furnace design, with excellent results. We are doing this ourselves in our own combustion department, transplanting the counterflow carburizing furnace, the chain conveyor furnace, and many of the external handling methods bodily into the fuel field.

We consider the possibilities of improved heating as yet only faintly realized. Many of our present methods will be best for a long time to come, but which ones are hard to predict. Many designs we now use were thought impossible to build a few years ago and we will certainly continue to find ways to do things that look impossible now.

British Version of the Origin of Stainless Steel

RIVALRY has existed for a long time between British and German metallurgists as to the origin of stainless steel. Some say that it was first discovered in Germany, while others contend that British metallurgists were first to introduce it. In *THE IRON AGE* of Dec. 5, 1929, page 1512, a German version of the origin of stainless steel was published as a translation of an article by Dr. P. H. Schottky, which appeared in *Monatshefte*, an organ of the Krupp company at Essen, Germany. Our attention has been called to a lengthy article which was published in England by P. R. Kuehnrich, managing director, Darwins, Ltd., Sheffield, and in order to give a British version of the controversy, we reproduce in the following paragraphs a brief part of that article, omitting the major portion which has to do with a controversy over patents:

In 1895 I was traveling in France on business. At that time the Sheffield firm of Marsh Brothers & Co., whose manager I was, supplied large quantities of steel for metal saw files. While visiting a user of this steel, Ebstein Frères at Jarville, near Nancy, M. Ebstein informed me that he had found another steel which gave much better results. This steel emanated from the firm of Jacob Holtzer.

At that time hacksaws with set teeth were not generally known and metal saws were made with a tapered back. The teeth of these saws were sharpened in the hardened state with small extra hard, three-square files, which naturally had to perform a strenuous task; consequently all file manufacturers were on the lookout for a better steel.

M. Ebstein gave me a piece of the alleged "wonder steel," which I had analyzed in Sheffield. To the astonishment of everyone concerned, it was found that the steel contained 2½ per cent of chromium, which was considered enormously high, because at that time small chromium contents of ½ to 1 per cent were the rule.

It was feared that more chromium would render the steel brittle, although it was already known that the firm of Jacob Holtzer was manufacturing a steel with a higher percentage of chromium for shells of high penetrating power. This steel was, however, not used for files.

I then caused a trial cast to be made at the Marsh works of a composition similar to that of Holtzer's mate-

rial, which contained 1.3 per cent carbon and 3.5 per cent chrome. This gave excellent results and was not only quite suitable for files, but also for a number of other purposes, such as hacksaws, twist drills and razors. Articles made from this steel were then put on the market and became favorably known as the Roxo brand.

Pocket knives for advertising purposes were also made from this steel, which I showed on my journeys as a curiosity. The blades were exceedingly sharp and had the peculiarity that, although the steel was very hard and would cut glass, the blades could easily be bent to an angle without breaking—a curious combination of great hardness and toughness. During the period between 1895 and 1903 large quantities of this 3½ per cent chrome steel were manufactured. Trials were made to increase the chrome to 4½ per cent without any difficulties being encountered.

Having now conclusively proved that the higher percentage of chromium was possible and useful—in spite of the prevailing opinion that it was dangerous—it occurred to me that it would be interesting to find out up to what limits the chromium content might be brought and yet obtain a material capable of being forged and rolled.

In the autumn of 1903 I therefore had a series of ingots melted in our works, containing 6, 9, 15, 18, 21 and 24 per cent of chromium. At that time carbon-free ferro-chromium was practically non-existent; Sheffield works generally used ferrochrome with 6 to 8 per cent carbon. Thus most of the ingots, especially the last four, came out too high in carbon. The ingots with 21 and 24 per cent chrome could not be forged at all.

After a few preliminary difficulties it was possible to forge the remaining ingots. Tests with 15 per cent chrome steel led to the surprising discovery that, when made into turning tools, this steel had similar qualities and gave rather better results than the original Musket self-hardening steel, which was at that time very popular.

The above mentioned trials were, at all events, the first stages of the development and commercializing of high-chromium special steels. In my opinion this occurrence constitutes the real birth of the fundamental properties of the high-chromium stainless steels.

Aircraft Made in Assembly Line

Construction of Sikorsky Amphibions Is Essentially of Metal—How Parts and Sub-Assemblies Are Fed In

WITH the completion of each new plant for the manufacture of airplanes, the fact that the aeronautical industry is profiting by the experience of the automobile industry becomes increasingly evident. Even though most aircraft factories are necessarily designed with a capacity for making a far less number of units than an automobile factory, the mass production methods so successfully used by the latter have been adopted, at least in modified form.

This is true of the new plant of the Sikorsky Aviation Corporation, Bridgeport, Conn., builder of Sikorsky S-38 "amphibians." Although the progressive assembly plan has been followed, the factory is laid out so that a comparatively quick and economical rearrangement can be made in case there should be a radical change in models. The plant is a self-contained unit, since everything in connection with the planes, except wheels, engines and other standard accessories, are made in one building.

The plant was built with the Monitor system of alternating low and high bays. This assures plenty of natural light at all parts of the factory. There are three bays 12 ft. high and 20 ft. wide, and three bays 20 ft. high and 30 ft. wide, on either side of the large assembly bay, which is 35 ft. high and 80 ft. wide. In the east side of the factory is the wing manufacturing department, and in the west side stockroom, machine shop, sheet-metal department and hull manufacturing. The main assembly of the plane, of course, is in the central bay.

Construction of the plane is essentially of metal. The aluminum alloy, duralumin, is used almost entirely except in highly stressed parts such as in the landing gear, some struts and fittings, etc., where chrome-molybdenum steel is used. The wings, with the exception of the fabric covering, are constructed of metal built up of duralumin sections riveted and bolted together. Welding is avoided entirely in the construction of the wings.



Metal structure was chosen for the framework of the wings instead of wood, because the Warren truss bolt-and-rivet construction is more reliable, has longer life, gives permanent alinement under all climatic conditions, and needs less inspection. Furthermore, a metal structure provides known strength with less chance of inferior workmanship, whereas the selection of straight-grained wood is a difficult task involving a hazardous human element.

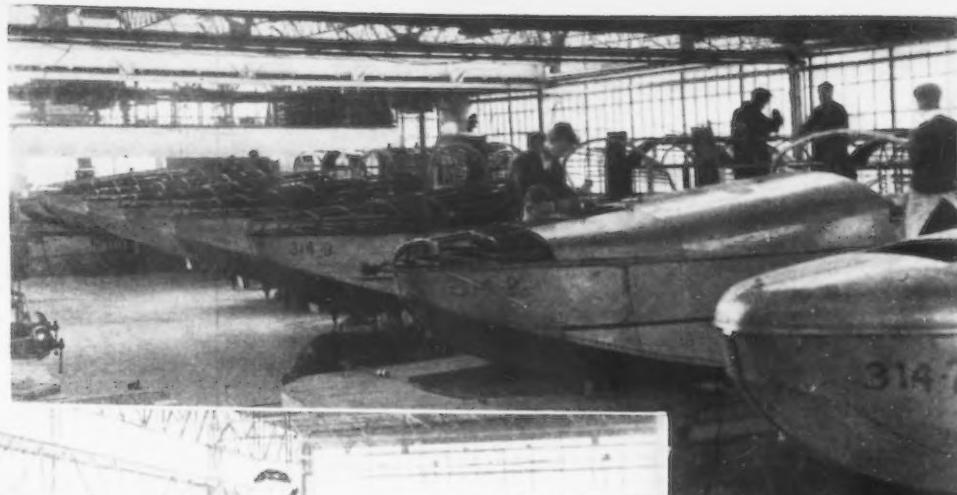
Ribs and spars are each built up separately. They are then dipped in red oxide paint, and baked in gas-fired ovens, as a protection against corrosion. Each wing section is then assembled in the proper line, along which it moves in the direction of the dope room at the end of the wing shop.

Before covering with fabric another coat of red oxide is sprayed on to cover up all rivet heads, scratches, or any parts left bare in the process of assembling. The wing is then placed on a special movable fixture which holds it in such manner that it can be rotated. It remains

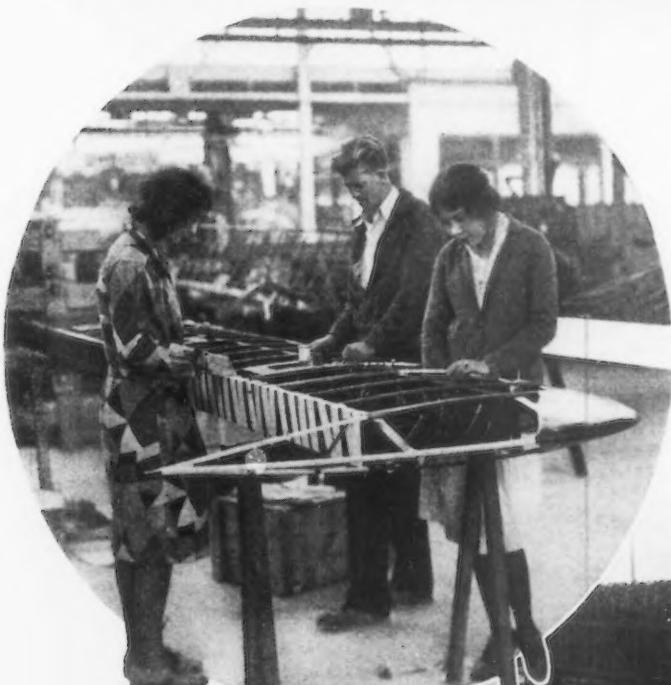


Hull Construction in Assembly Line. Final touches are being put on the hull of a Sikorsky amphibion, type S-38, preparatory to attaching wings and installing power plant. In circle at top is a twin-motored Sikorsky amphibion, 8 to 10 passenger plane, powered with 425-hp. Pratt & Whitney Wasp engines. More than 50 of these planes have been built

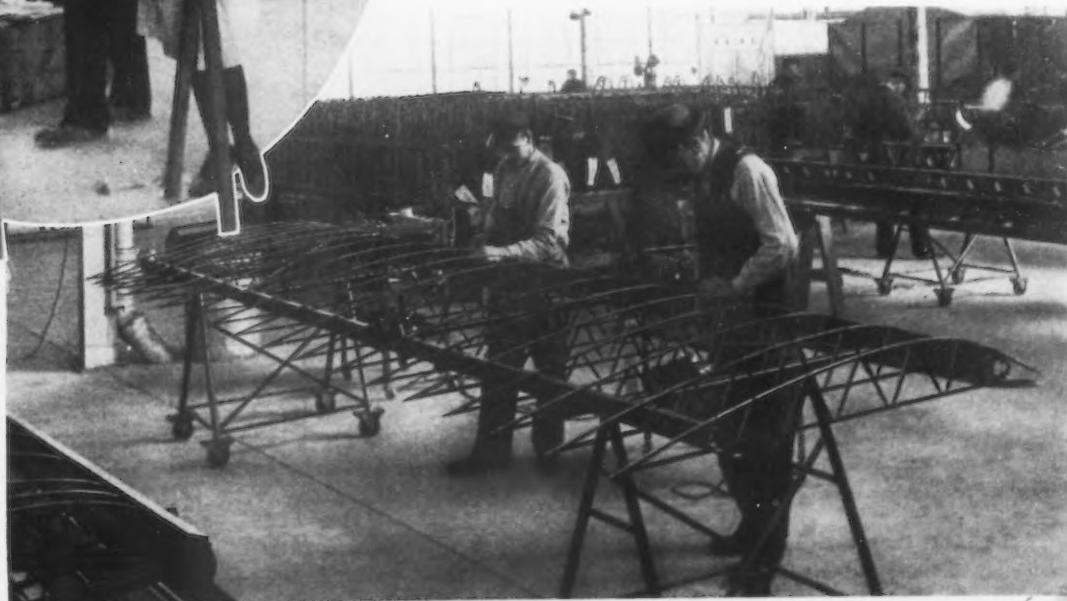
HULL Department Assembly Line (Right). Hulls under construction progress regularly toward the right until finished



INSTALLATION of Pratt & Whitney Wasp Engines (Left) on Two Partly Completed Sikorsky Amphibions, S-38, in the Main Bay of the Bridgeport Factory. The men work from the elevated platform at right



WING Construction. The section shown is part of the lower wing. Above, the girls are sewing wing fabric. Experience has proved that women are more efficient at this type of work than men



on this fixture through the operation of fabric covering and doping, and also in storage while waiting to be attached to the plane. All operations are done in a vertical position wherever possible, to conserve space.

After being covered with fabric the wings are sent to the dope room for treatment, which consists generally of five coats of "dope." The first coat is put on by brush to get the necessary penetration, and the wings are then taped (that is, the tape is put on to cover up all holes made by the needle in sewing on the fabric). The second coat of clear dope is put on by brush, also, and then three coats of dope, pigmented with aluminum powder, are sprayed on. The spraying is done semi-automatically; the wing, in a vertical position on the special fixture mentioned above, is pulled slowly past the spraying station by means of a cable operated by an air motor. The wing

is sprayed from each side simultaneously as it moves past the operator. Considerable time and space are saved by this method.

After the wings are painted, the outer and lower wings are stored in the assembly bay at a point near the last position of the planes in the assembly line. The center wing section, into which the fuel tanks are built and to which the tail surfaces are attached by means of out-

parallel with the main assembly line along the west side of the bay, so that the hulls face it. Built on this platform is a monorail system which carries the motor while being prepared for assembly to the plane. The motors as received from the motor factory are lifted to the platform by means of a 4-ton Shaw electric crane, which operates the whole length of the assembly bay. The motors progress in a direction opposite to the movement of the planes, and at a prescribed station in the line they are swung out into position on the plane by jib cranes.

In building the plane thorough inspection is given each part. This inspection starts with the raw material when received, and is carried through during the manufacture and assembly of the parts. Particular attention is paid to finishing as a protection against corrosion.

PLATING Barrel and Tanks (Left) in Cadmium Plating Room



HEAT - TREATING
Furnace for Dural Rivets, Showing the Automatic Temperature Control (Right)

CADMIDIUM Plating Room (Lower Right), General View, Showing Automatic Baking Oven in Center

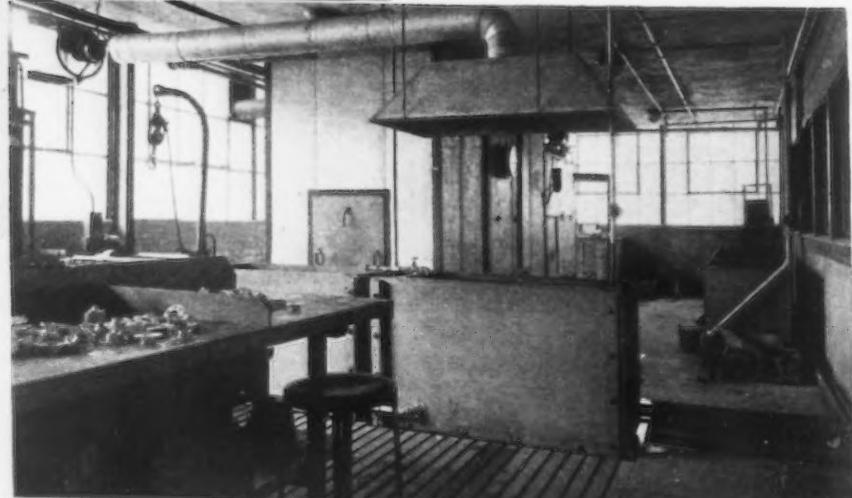
riggers, moves down from the dope room to the first position in the assembly line. During this journey the tanks, outriggers, and tail surfaces are assembled and the whole unit is attached to the hull at the first assembly position.

As the plane goes along the main assembly line the motors are mounted into position, the main struts are attached, fuel lines and instruments installed. The outer and lower wings and the wheels are installed in the last position. During its movement along the assembly line the plane is at right angles to its line of travel; in the last position, it is turned facing the door, for the assembly of the wings.

The method used in getting the motor into position is uncommon. A platform about 8 ft. high runs for 130 ft.

All steel parts are thoroughly cleaned by sand blasting, after which they are cadmium plated and painted with red oxide. The plating process consists of dipping first in a cleaning solution to remove all grease, dirt, etc., after which they are rinsed with cold water, dipped in a solution of 10 per cent sulphuric acid, cold rinsed, dipped in cyanide, cold rinsed once more, and then electroplated with cadmium. The small parts are plated in a revolving barrel driven by a 1/6-hp. motor, the large parts in a still tank. After plating, the parts are cold rinsed and hot rinsed, and welded parts or parts with hollow sections are dipped in linseed oil as a precaution against any chance of the plating solution remaining in crevices and starting corrosion.

Small metal parts are painted by means of an automatic conveyor oven unit which dips the parts in the paint, carries them through the oven, returning to the original point in 1½ hr.



Heat treating is a very important process in the fabrication of duralumin parts. When heat treated at a temperature of 950 deg. Fahr. the metal has the strength of steel, and attains its maximum resistance to corrosion. Large pieces are heat treated in a muffle type gas-fired furnace having a heating chamber 12½ ft. deep, 4½ ft. wide, and 2 ft. high. Small parts, mainly rivets, are heat treated in small cylindrical electric furnaces located at

advantageous points in the plant. The temperatures of all furnaces are automatically controlled.

Strut fittings, control parts, etc., are made in the machine shop, which is equipped throughout with standard type motor-driven machine tools of the latest design. Electric power is transmitted to the individual machines by means of an extensive overhead duct system. Since power by this method can be supplied to any point in the shop, it gives complete flexibility in arranging the position of machine tools relative to any possible changes in layout at a later date. There is a power press department for stamping steel as well as duralumin parts; but, on account of the limited quantity required, a great many are made in the machine shop, and by hand, which otherwise could be stamped.

In addition to the manufacturing building the new plant includes a two-story office building, service building with its own machine shop, and an engineering building for assembling new models. A wind tunnel for testing models up to 4 ft. span will be completed in March, being connected with the engineering building by a passageway. It will be of the vertical type, rarely used in the United States, and will be housed in an octagonal building 28 ft. in diameter and 33 ft. high.

Six acres of land adjoining the factory have been purchased to provide a right of way to the Bridgeport Airport, a few hundred yards distant. A runway will be made here, connecting with the company's street and the causeway to the water.

A 1500-ft. causeway, 30 ft. wide, is being filled into deep water in the Housatonic River. At the foot of the runway is a platform 64 ft. wide for turning planes before or after landing. Adjacent to the platform is a 40-ft. ramp leading down into the water at a 12 per cent grade. On either side of the platform are wharf facilities for motor boats. So far as is known, the company is the only manufacturer of aircraft having a seaplane base in its back yard and an airport in its front yard.

The entire plant will give 195,400 sq. ft. of floor space and the site owned by the company covers 36 acres. All buildings were designed by W. A. Bary, vice-president and general manager, and N. O. Smith-Peterson, factory construction engineer. The present capacity of the plant is five planes a week.

The amphibion hull is 30 ft. long with a 62-in. beam, which is increased at the bottom to 82 in. by means of large sponsons. The bottom is built with a 17-deg. V at the step. Attached to the lower wing on each side of the hull is a pontoon similar in shape to the hull. In addi-

tion to the compartments for baggage and freight the hull contains the pilot's compartment and an electrically lighted passenger cabin having two rows of four comfortable wicker chairs each. Two more chairs may be provided, if desired. The cabin is entered by steps from a hatchway in its top, an arrangement superior to the use of a side door because the sliding top is opened into the air, even on a rough sea, with no danger of water entering the cabin.

The S-38 amphibion is powered by two 420-hp. Pratt & Whitney Wasp motors operating at 2000 r.p.m. Its wing span is 71 ft. 8 in., length overall 40 ft. 3 in. and height 13 ft. 10 in. The plane empty weighs 6500 lb. Its cruising speed at sea level is 110 miles an hour. It has a ceiling of 18,000 ft., a high speed of over 125 miles an hour and it will fly on one engine with a gross load of 9600 lb.

Until recently the Sikorsky Aviation Corporation was known as the Sikorsky Mfg. Corporation. The latter company, organized in 1925 as an outgrowth of the Sikorsky Aero Engineering Corporation formed two years previously, began operations at Roosevelt Field, Long Island, N. Y., moving shortly afterward to College Point, N. Y., where it occupied a building having 40,000 sq. ft. of manufacturing space.

In the spring of 1929 the company was acquired by the United Aircraft & Transport Corporation,

New York, of which Frederick B. Rentschler is president. The Sikorsky Aviation Corporation is headed by A. C. Dickinson, president; W. A. Bary, vice-president and general manager; Igor Sikorsky, vice-president in charge of engineering, who is recognized as one of the world's outstanding designers of aircraft.

Facts About Chromium Plating

"Commercial Chromium Plating" is the title of a 60-page pamphlet which has been issued by the department of engineering research, University of Michigan, Ann Arbor, Mich. The author is Richard Schneidewind, associate investigator of that department of the university.

The properties of chromium plating, the equipment needed and the effects of variations in plating conditions and solutions are discussed at length. There are also notes of throwing power, and a chapter on controlled methods. Important discussions are those on defective chromium plating. The object of the pamphlet, which has numerous illustrations and charts, is to present in a simple form some of the general information necessary for the design of chromium plating equipment and cover the mechanism of chromium deposition from chromic-acid baths.

To Clean Billet Surface by Machine

Hand Labor Expensive and Uncertain—Several Types of Machine Have Been Tried—Suggested New Equipment

BY ROBERT S. HAYDOCK*

IN the manufacture of steel certain small surface defects occur which it is necessary to remove from the billets to obtain a perfect surface on the finished product. The seams and broken surfaces are generally believed to originate in the pouring or cooling of the ingot, but some scratches undoubtedly should be charged to the rolls or guides of the mills.

Perhaps some day improved pouring and rolling practice may eliminate many of these defects, but for the present the operating force must chip them out as they appear. Chipping billets has been done customarily with inexpensive tools and with crude facilities for handling the billets. Naturally, labor costs are high and working conditions none too good.

Chipping Is Expensive and Annoying

Considerable skill is necessary to make a good chipper. From two to three months is required to bring a man's output of chipped billets to full capacity. And when a mill books a large tonnage of new business, and has to expand its chipper force quickly, the new men operate at low efficiency.

Use of the hand-operated air-hammer chipping tool is very tiring. After a few years the chippers, subjected to the continual vibration of the tool, become unable to continue. Although the hourly rate is comparatively high, the type of labor that will do the work is mostly foreign and is unusually difficult to get along with.

Some mills pickle billets before chipping; on the clean surface the defects are seen more easily and inspection is much simplified, and the inspection force is thus reduced.

The depth of cut required to remove the defects varies. On smooth billets it is believed by most mill men that $1/16$ in. will remove 90 per cent of the defects, but the author has seen billets chipped to a depth of $\frac{3}{4}$ in. Where ragged rolls are used, the seams show at the bottom of the ragging, and of course the depth of ragging must be added to the depth of cut to remove the seam.

Surface Milling Sometimes Used

To overcome these difficulties a method of surface milling is in use to a limited extent, where the conditions are such as to demand that the entire surface of the billet be removed. These machines usually have clamping devices to hold two billets, side by side. Although the work turned out is satisfactory, the speed of the table is only a few inches a minute. Hence the costs of labor and the interest on the rather expensive machinery are correspondingly high per ton of billets.

A type of milling machine called a deseamer has been tried out. In this device a formed milling cutter revolves, the cutting edges being shaped to a curve somewhat like the ordinary hand-chipping chisel. It is arranged to move

*Consulting engineer, New York. This is abstract of a paper presented before a meeting in Akron, Ohio, of the American Society of Mechanical Engineers.

in and out, also up and down, while the table carrying the billet moves horizontally. All of these movements are under electrical control by the operator, who can cause the deseamer milling cutter to remove the metal from the face of the billet in such places as required.

Deseamer Makes Less Scrap Loss

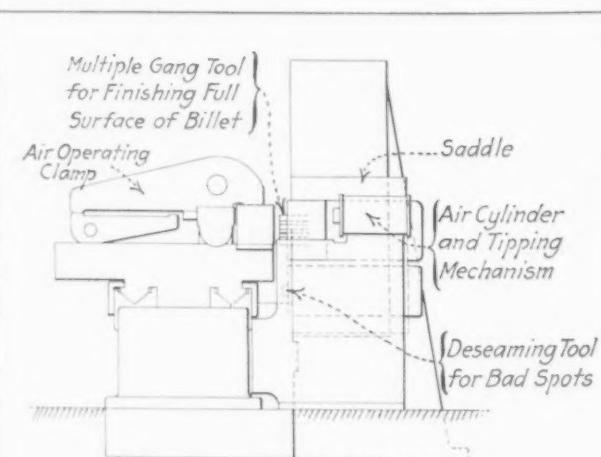
One advantage claimed for this method is that the amount of scrap produced is smaller than with the surface miller. Although this is no doubt true, the time required is considerable, as only a small surface is worked on at one time. Another advantage of the deseamer is that, on account of the universal movement of its cutter, a crooked billet can be dealt with.

A type of planer has been developed in England for planing bars. A double table is used, so that, while the bars on one table are being planed, the other table is being unloaded and reloaded with bars to be planed.

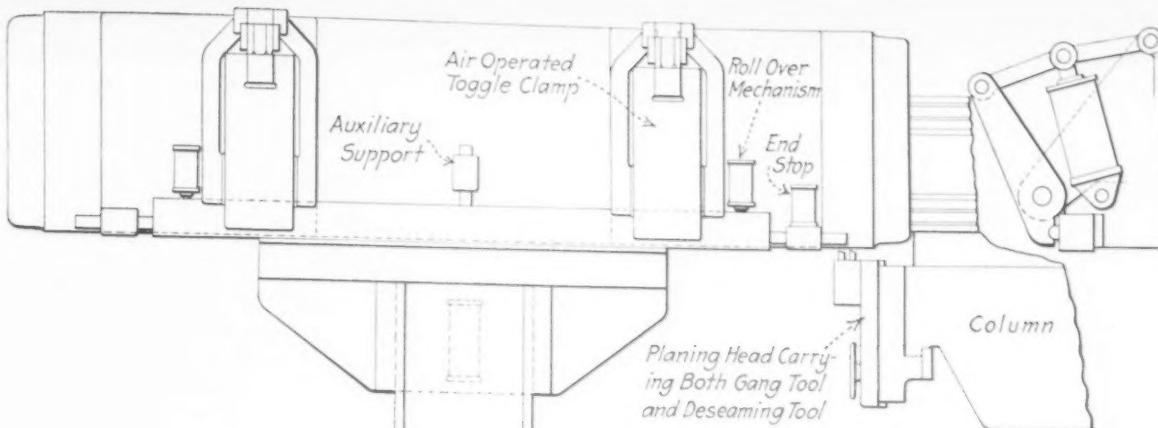
In all of the foregoing machines, and also in the hand-chipping practice, the billets are handled by overhead crane. They are turned over either by the crane or by a crude hand lever, and are adjusted to position usually by a sledge hammer.

Billet Peeler for Round Sections

A new machine called a billet peeler has been introduced lately. This is arranged to grip a round billet and push it through a revolving head fitted with multiple cutters. The peeled end is then gripped in another holder and the entire billet pulled through the cutter head, when a releas-



CROSS Section of Proposed Billet Surface-Cleaning Machine. The square under right end of air clamp is the billet. Two slides on vertical column carry gang tool and deseaming tool respectively



Top View or Plan of Proposed Billet Cleaner. The billet is held rigidly by stops and clamps while its surface is attacked by the tools

ing mechanism discharged the peeled billet to the floor.

In actual usage the cutters stand up for 3 or 4 hr. at a cutting speed of 40 ft. a minute. As the hydraulic device is arranged to handle the cutting head, it can be replaced with a spare head with sharpened cutters in a few minutes. Another advantage of this machine is that it can handle crooked billets if not too badly bent.

This machine cuts $\frac{1}{4}$ in. deep, or reduces an $8\frac{1}{4}$ -in. billet to 8 in. diameter, at the rate of 480 tons in 24 hr. The disadvantage of the machine is that it is limited to round billets, while by far the greatest tonnage of billets manufactured is square.

Planers Need Straight Billets

Considerable effort has been made to apply tools of the planer type to surface billets. One of the difficulties in tools of this kind is that their efficiency depends on the ability to take off a thin layer from the face of the billet. This is mechanically easy and economically attractive only when the billet is straight and when a layer of predetermined thickness can be quickly removed. As it happens, most billets are not straight, largely because very little effort is made to keep them so. Hot shearing is apt to produce a hooked end, also, which can be handled by a planer, but not with perfect ease.

One remedy for this situation is to roll and shear billets so that they remain straight. Some mill men say that it can be done; others say that with proper organization it can be done easily. The fact remains, however, that nobody is actually doing it today.

Straightening Billets a Problem

To meet this condition a billet straightener has been developed. Essentially, this does not differ much from a blooming mill manipulator. As a matter of fact, the latter is occasionally used for straightening billets on special orders, though not infrequently with disastrous results, as the manipulator is not adapted to the heavy pressure or blows required in straightening the billet. In the present straightener one platen is stationary while the other is movable, partly effected by a screw so as to give a quick transit where great pressure is required by the hydraulic cylinders.

The proposed arrangement is to locate the manipulator directly behind the hot shears, the billet going into the manipulator from the latter and receiving one squeeze and then being turned over for the second squeeze. As there

is a man standing there to kick off the billets coming from the hot shears, no additional labor for operating the straightener is required.

Machine Designed to Clean Billets

DISCUSSION of this paper by Carl Linden, Cincinnati Planer Co., Cincinnati, took the form of a description of a machine designed to remove seams from billets. This follows.

A planer equipped with many special devices for removing seams in billets has been worked out by the Cincinnati Planer Co. This machine will be similar in design to an open-side planer except that the rail is left off. A special heavy-duty side head will be mounted on the column in such a manner as to accommodate a 100-hp. cut.

The bed, twice as long as the table, has forced lubrication to the vees by means of a reversible pump driven from the drive gears. The bed, of exceptionally heavy design, will have a check cast on the right side near the center, to support the uprights.

The chrome-nickel steel gearing in this machine will be of herringbone type up to the bull wheel; the rack, of chrome-nickel steel forgings, heat treated. All gearing will be flooded with oil. The gears will be keyed to high-carbon steel shafts mounted in bearings in the side walls of the bed. These bearings will be oiled from the pump which provides oil to the bed vees. A 100-hp. reversing motor connected to this gearing will drive the table.

Of box-type construction, the table will have a guide between the ways and also clamps on both sides, the full length, to prevent lifting. It will have the necessary width to accommodate the clamping and roll-over devices. Where the billet is turned over and held on the table, hardened steel strips will be inserted, to prevent wear.

A special heavy head will be mounted on the upright, with a tool holder carrying a number of cutting tools. These tools will occupy a space of approximately 5 in. in width so that, with one pass of the planer table, 5 in. of steel will be removed to a depth of $1/16$ in. This head will have end feed for feeding the head in relation to the size of the billet. For the head, power movement will be provided through a small motor on the upright, controlled by a push button, and it can be operated on either the cut or return stroke of the table. In this way the operator can set the tool another 5 in. to finish surfacing the side of a 10-in. billet.

This head will carry a radius tool also, which will put

a radius on the four corners of the billet. This does not require an extra pass, but will be done when the side is being planed.

Deep Seams Handled from Second Tool Head

A second slide on the head will be used for removing seams deeper than $1/16$ in. It will carry a single round tool and can be raised or lowered by use of push buttons. When making this operation, the table speed can be cut down to approximately 10 ft. a minute and the operator, by means of push buttons, can feed the single tool into the billet or up and down the sides at will, following the seam. When near the end of the seam, he can withdraw the tool gradually and in this way eliminate all sharp edges. As this tool is made round on the end, it will not leave an abrupt groove in the billet. If necessary, where the radius and straight surfaces meet, a second pass will eliminate this sharp edge.

Clamping and turning devices will be mounted on the regular planer. On each side will be a stationary table. On the front side this table will be used for loading the planer and turning over the billet. On the rear side of the column the table will be used for unloading and passing the billet to trucks. An air cylinder will force the rough billet against the stops on the planer table. A cylinder on the end of the table will then force the billet against the end stop. Then a large clamp operated by another air cylinder will hold the billet in position for planing.

If a 10-in. billet is being planed, it will be necessary to move the side head 5 in. to remove the scale from the rest of the surface. The table is then brought to the front position and the clamps are released. By means of a roll-

over mechanism on the table, this billet will be rolled over 90 deg. and on to the stationary front table. The front auxiliary table cylinder will then again push the billet into position on the machine, and the same operation takes place again. Rolling over and clamping take about 10 sec.

After the billet is machined any short, deep seams located are removed by the single round tool. If the billet is inspected before it comes to the planer and deep seams are located, it may not be necessary to plane the entire face. The single tool head can remove seams, and the turning-over device can be used in the manner described.

Flexibility in Operation a Feature

The operator can adjust the operating devices or other details on the table to suit different billets, either in length or cross-section. Standing between the head and the front auxiliary table, the operator can perform all the operations without touching the billets. Valves or controlling cylinders will be placed convenient to his hand. Push buttons for operating the table and the heads will be placed there also.

Chips, which will fall below the tools or in a space in front of the tools, will drop into a pit in which large pans will catch them. They can be removed thence at any time.

It has been found in general practice that $1/16$ in. is all the cut required to remove the seams in billets. A cut 5 in. wide by $1/16$ in. deep, in ordinary steel, at 40 ft. a minute, will require approximately 75 hp. If it is found that $1/16$ in. will not remove the entire seams, and if it be necessary to take $3/32$ in. depth, this will consume about 95 hp. When using a single tool, the power consumption will be much less.

Heterogeneity in Steel Ingots and Its Amelioration

EXAMINATION of a section through the axes of ingots made of piping steel has shown marked heterogeneity to exist, said Dr. W. H. Hatfield in his William Menelaus memorial lecture delivered before the South Wales Institute of Engineers at Cardiff. He went on to state that a complete examination of this phenomenon is not available, since many fundamental data are lacking.

Among the items of missing information are: distribution of temperature after various intervals of time, the presence or absence of convection currents, viscosity of the liquid steel at various temperatures, the possibility of crystallites falling in the portion still liquid, variation of composition in that portion, the degree of undercooling, influence of the separation of the ingot from the mold, various physical constants of the steel and of the ingot mold material, the influence of latent heat, etc.

Effects of Differential Freezing

Heterogeneity is to be expected on account of the differential freezing which occurs from liquid solutions. The first crystallites to appear at the liquidus are purer than the average composition; hence, the mother liquor must become richer in the solute. The later stages of freezing are not consistent with the steady thickening up from the mold walls and bottom.

It is possible that the purity of the central lower portion may be due to the Soret effect or to falling crystallites. The delta phase may also play a part.

Richest in segregate are the last portions to freeze—those in proximity to the pipe. Because of the differential freezing the zone of enriched liquor at the solid-liquid

boundary must in its last stages be of very high concentration. It will exist as pools or strings which go to form the A segregate.

Examination of this segregate shows that the carbon, sulphur and phosphorus segregate to a marked extent—silicon and manganese only slightly. This latter is remarkable, as the sulphur in the segregate usually is associated with manganese. It is suggested that at high temperatures the sulphur is really in combination with the iron as FeS, and that a reaction with manganese takes place at lower temperatures, with the formation of some MnS.

Factors Affecting Homogeneity

Mass, type of ingot and composition of the steel all may affect the amount of heterogeneity in an ingot. The question of the formation of zones of intense segregation is not solved, since it is unknown whether the columnar crystals squeeze out the segregate or non-metallic matter, or whether the zone of increasing concentration is due merely to the automatic increase brought about by the differential freezing.

To decrease heterogeneity the author suggests that the mold should be wider at the top and should have an adequate refractory-lined feeder head. The steel should be cast at as low a temperature as practicable. The size of nozzle should be suitable for the size of ingot and for the nature and temperature of the steel. The steel should be effectively deoxidized before it leaves the furnace. Its sulphur content should be as low as possible and the phosphorus may with advantage be at a low value.

Examining Arc Welds For Quality

Kerosene Penetration Indicates Soundness Only—Quality of Tone Cannot Distinguish Good from Fair Welds, Nor Can Visual Inspection
—Correct Procedure Control Is Indispensable

BY GERALD C. WARD, B.S.*

IT has long been realized by proponents of structural welding that it is difficult to determine the conditions inside an arc weld without actually destroying it for purposes of examination. It has also been realized that one of the chief obstacles to general acceptance of the weld in structural work has been this supposed impossibility of accurate inspection of the finished work.

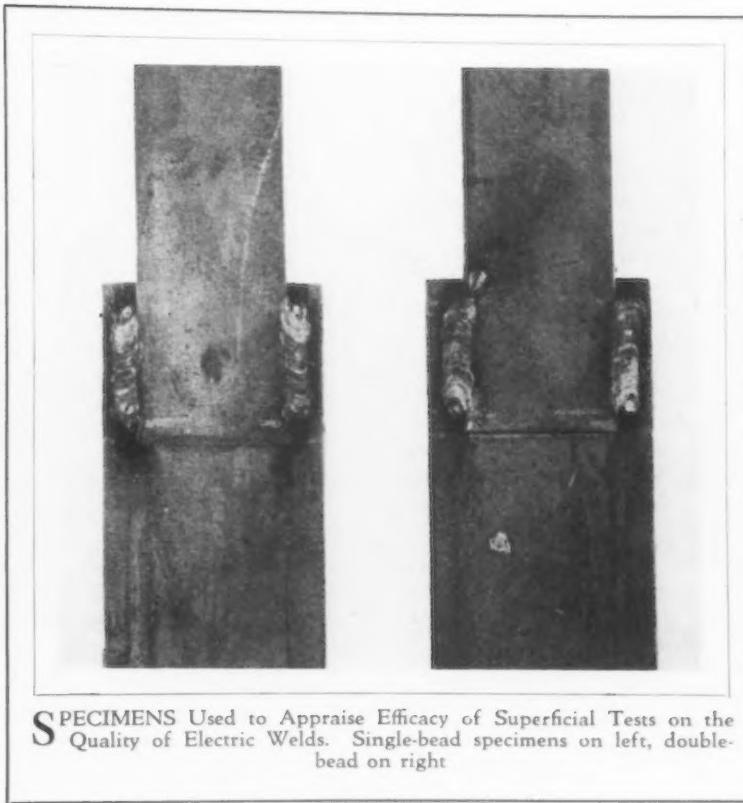
Several methods have been proposed for inspecting a finished weld, but there has been considerable difference of opinion as to their effectiveness for ascertaining its quality and reliability.

A two-year study has been carried on at the University of Wisconsin for the purpose of gaining information and data in regard to various types of inspection methods. In 1928 this study was conducted by Clyde K. Stephens and in 1929 by the writer.[†]

It was desired to use only tests which would lend themselves to field use; any that required extensive apparatus or extremely careful technique were barred. Sound tests were given some consideration, but the tests most carefully studied were the kerosene penetration test and the visual inspection test. After attempts had been made in that manner to judge the quality of each specimen, the welds were broken in a standard testing machine, in order that appraisals might be verified.

Proper Current Conditions Essential

The accompanying illustration shows the type of specimen used in this work—a 3 x 10 x ¼-in. steel plate lapped 2 in. over a 4 x 10 x ¼-in. plate, the two connected by 1½-in. longitudinal fillet welds. The specimens were carefully alined before welding and were clamped in position



SPECIMENS Used to Appraise Efficacy of Superficial Tests on the Quality of Electric Welds. Single-bead specimens on left, double-bead on right

during the process. First quality welding wire, of the proper size for the current, was used. Welding was done in the university shops, using Westinghouse equipment.

In making up the welded specimens it was not the desire to attain perfection. In fact, many of the specimens were deliberately made faulty, and an attempt made to cover up enough defects to get by the inspectors. In some instances, rusty surfaces were not cleaned off, paint and oil were left on the surfaces to be welded, inexpert operators made some of the specimens, and in some of the work two beads were

used, the first one being merely laid on the surface of the base metal with inadequate current, and a second bead being run to cover up the deficiencies of the first.

It was found by Mr. Stephens that the presence of a moderate amount of rust, paint or oil had little effect upon the subsequent strength of the welds. Inasmuch as only a few specimens of this kind were made, however, the results are not conclusive. He also found that a fairly good weld could be made by a novice, given the proper voltage and current, but that expert operators had difficulty in making good welds when the current used was insufficient.

Kerosene Penetration Tests for Soundness, But Not Strength

The kerosene penetration tests used by Mr. Stephens were made by building small putty dams around the joint, sealing it at all points except the surfaces of the welds and an aperture for introducing the kerosene, which was then applied to the joint under slight hydrostatic head and allowed to stand for 20 min. Due to the penetrating character of the liquid and to the slight head, a wet spot of kerosene could be detected on the other surface of a defective weld, where the kerosene seeped through the spongy weld metal. It was found that in no case did this test fail to indicate a questionable or poor specimen in the

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[†]Valuable assistance and cooperation were rendered by the Allis-Chalmers Mfg. Co., the Heil Co., and the Vilter Mfg. Co., all of Milwaukee, and the Madison Welding & Supply Co., of Madison, Wis. The work was done under direction of Prof. R. J. Roark, department of mechanics, University of Wisconsin.

1928 tests, and negative results were invariably secured with good specimens.

The writer, in penetration tests made during 1929, used the same method, but cut the time of application down to about a minute. Substantially different results were secured. It was found that some of the weakest specimens gave negative penetration results, while some of the strong ones allowed the kerosene to seep through the welds. For instance, in specimen No. 6, made by an experienced workman with proper current conditions, both welds were porous, yet the sound test was "clear" and the weld strength of 7120 lb. per linear inch was exceeded by only two other specimens. Furthermore, 12 of the 16 specimens graded "poor" in strength were tight against penetration by kerosene.

In most cases where the kerosene came through trouble had been experienced with the arc at the point of penetration. It is thought, therefore, that the discontinuity in the weld which is created when the arc is broken may not be entirely filled up when the arc is restruck, and this leaves a channel for penetration. On the other hand, even though an arc is broken and a capillary thus left in the weld, the arc may be of proper length and the power input may be correct, and all other portions of the weld may be well made and properly fused with the base metal. In such a joint it is probable that the weld is nearly as strong as one which is entirely continuous throughout its length, regardless of the fact that it can be penetrated by kerosene.

The kerosene penetration test is no doubt an excellent index as to the porosity of a weld, but the results of this study would indicate that it cannot be used as a criterion either for unit breaking stress or strength of the weld per lineal inch.

Sound Tests Erratic

Sound tests were made by suspending the specimens in identically the same way, and striking them at identical points with the same instrument. The tones given off were classified in four ways, but they failed to provide an index as to the quality of the welds, as will be seen from the statement below:

Note	Number of Specimens	Range in Linear Strength	
		Maximum	Minimum
Very clear.....	5	7,110	4,620
Clear	13	7,120	4,080
Dull	9	7,140	3,450
Very dull	3	5,730	2,290

Visual Inspection Correct Only Part of the Time

After the writer's specimens were completed, the oxides were thoroughly brushed off the welds and the specimens were given, as opportunity presented, to 31 experienced welders. Each of these men gave an independent rating for each specimen, on the basis of supposed soundness and strength. Thirty-one independent expert opinions were thus secured on each welded specimen, as to whether it was "good," "fair," or "poor." These volunteer "inspectors" were all workmen of proved ability; most of them had more than 10 years' experience (the range was 1 to 21 years), and among them were two instructors in welding practice at the University of Wisconsin.

The percentage of error (when compared with the grade or strength developed in tests to destruction) was very high. Four weak specimens were judged very accurately, thus:

Specimen No.	Linear Strength	Number of Inspectors Grading			Per Cent Error in Visual Inspection
		Good	Fair	Poor	
20.....	4,550	None	2	29	6
21.....	4,980	None	1	30	3
22.....	4,700	None	1	30	3
28.....	2,290	None	1	30	3

Perhaps the reason that these four weak specimens were judged so accurately was that they were so obviously faulty that no experienced welder could mistake them. On the other hand, four other specimens had a linear strength of less than 4500 lb. and were undoubtedly poor welds. The inspectors graded these as follows:

Specimen No.	Linear Strength	Number of Inspectors Grading			Per Cent Error in Visual Inspection
		Good	Fair	Poor	
7.....	3,590	None	14	17	45
9.....	4,080	10	16	5	84
14.....	3,450	11	17	3	90
15.....	4,310	14	14	3	90

Specimen 9 may perhaps be regarded as the clearest example of the inadequacy of the inspection methods used. As to tensile strength it was the poorest save three in a set of 30, yet it was tight against kerosene, gave a clear note when struck, and fooled 26 of the 31 inspectors who examined its surface!

It is evident that no group of welders, without special training or experience, can inspect a specimen such as the ones furnished and be able to estimate the quality of the welds, without further knowledge as to the way in which the welding was done. Furthermore, very rarely has a single welder this ability. For instance, inspector No. 19, with five years' welding experience, rated each of specimens 9, 14 and 15 as "poor," and in fact he gave a correct appraisal on three out of four samples, making the highest score for accuracy of any of the inspectors. Yet inspector No. 1, with 10 years' welding experience, who also rated specimens 9, 14 and 15 correctly, was wrong in nearly half his other ratings. Seventeen of the appraisers were in error in their ratings, by visual inspection, between 57 and 67 per cent of the time.

The results obtained from the visual inspection tests, therefore, indicate that such a test is impracticable for determining the quality of a weld, where the inspector is not familiar with the method by which the weld was made.

Inspection During Welding Is Necessary

The matter of procedure control seems all important. As has been previously stated, if a novice is supplied with the proper tools and power input, he can make a passable weld. But the expert is hard put to it to make a good weld if his materials or his power are not suited to the work in hand.

In this study the first six specimens were made with proper procedure, with good results. Linear strength on test ranged from 6140 to 7140 lb. But the moment the amperage and the voltage were reduced, or the arc was broken repeatedly, the strength of the work dropped and the quality remained consistently poor, the strength never again reaching 6000 lb. per linear inch.

These superficial tests, then, are valuable only as they indicate the porosity of the weld, its degree of fusion, and the procedure followed in making the weld—they cannot be depended upon as indices of the strength of the weld or its internal character. It is concluded, therefore, that the tests are secondary in importance in the making of a sound structural joint, and that the emphasis must be placed upon procedure control.

Up to a year or two ago a 6-in. pipe was about the largest diameter which could be satisfactorily butt welded by the resistance process. Now it is common practice to weld 8 or 10 or even 12-in. pipe by this method. In the opinion of a committee of the American Welding Society there seems to be no reason why a 28 or 30-in. steel pipe, as used in long trunk lines for gas, could not be welded, if the customer would be willing to buy the machine and the necessary power to operate it.



BOOK REVIEWS



Notable Book For Steel Makers

Practical Steel Making. By Walter Lister. 413 pages, 5 $\frac{1}{2}$ x 9 in. Published for Richard Rimbach, 1117 Wolfendale St., Pittsburgh. Price \$7.25.

Sandwiched in among the many duties devolving upon an active open-hearth superintendent, I put in a great number of hours studying it, for I found it in many places of absorbing interest. I have not read a book on iron and steel in the last fifteen years which was of such interest. S. A. Jackson, who wrote the foreword, is quite correct in his statement that students can get far more of practical benefit from the papers published by the various institutes and societies than from technical books, but in this respect the work of Lister comes as a very pleasant change. I am very sure it can be read with great profit, not only by the student but by those who have added a few years of practical operating experience to a technical knowledge.

This work is a very painstaking and truly noteworthy effort, covering the entire field of steel making with the exception of the crucible method. Some sections are much stronger than others in authoritative statement. For example the open-hearth and electric furnace methods are well considered, but the Bessemer processes are viewed in too pessimistic a light, being consigned to the realm of inferior steel products. This is not justified by fact, considering the present day investigations concerning acid Bessemer steel and the fact that it suits many products from which it has been crowded by open-hearth steel. Again it must be borne in mind that the Germans have very successfully competed against the open-hearth with basic Bessemer steel.

Some will not agree with Lister's views on acid practice and pitwork. The paper by de Maré on the acid process in American Iron and Steel Institute proceedings stands as a classic and, for that matter, a reference standard. The chapter on pitwork does not bring out, perhaps, the best accepted American and German standards. In the theory of uphill or bottom-cast pouring, the Germans have been particularly apt in getting at the foundations of successful practice.

Notwithstanding the fact that the steel making methods described are dictated somewhat by the raw materials available in Great Britain, the practical details of the charges, the working of the heat, and the kinds and amounts of additions as given, provide the student and operator with data to check his theoretical and practical ideas, and which are very seldom available in a reference work. The opportunity to refer to and check the efficiency of additions is very much worth while in itself.

Methods described for putting in basic open-hearth bottoms and the choice of materials for refractories do not represent what we call the best practice on this side of the water, but undoubtedly success has been obtained with these methods in Great Britain. A book on practical steel making probably does not require a thorough discussion of the most modern details of furnace construction and of auxiliary appliances. For that reason the author can be forgiven for the fact that the details of construction and repair and the description of auxiliary equipment do not cover the most modern types and practice (based, of course, on our American ideas of what is modern), but nevertheless they are given in a very practical way and provide very interesting and valuable comparisons.

The book under discussion is quite unique and valuable; as a matter of fact I cannot rate it by comparison against any other work of the kind, since I have not had an opportunity to read one of its particular scope in the English language.

F. T.

The Spirit Behind General Electric

Forty Years with General Electric. By John T. Broderick. 218 pages, 5 x 7 $\frac{1}{2}$ in. Fort Orange Press, Albany, N. Y. Price \$2.50.

As a history of marvelous growth, and the reasons therefor, this book is interesting. Largely biographical, it contains incidental information showing the expansion of a great corporation during four decades. It describes intimately such giants in finance, invention, manufacture, organization and salesmanship as Coffin, Steinmetz, Thompson, Rice, Insull *et omne genus*.

"Spirit" is the theme of the book. The Coffin policy was for the employment of capital for extending and creating markets. Griffin emphasized sales based on the merits of the product offered, not on detraction of others. Rice laid weight on ascertaining the causes of a disclosed deficiency, and applying remedies. Considerable space is devoted to clarification of the popular conception of "the Wizard" Steinmetz. Under "Radio" allusion is made to Bellamy's romances, now come true; and the General Electric Co.'s research is duly appreciated.

The chapter devoted to Elihu Thompson notes his intellectual progress from 1877, when I saw him at the Franklin Institute, as a young man of 24, reverse the Ruhmkorff coil by sending a Leyden jar charge through its secondary wire, to the present day, when, full of honors, he is credited with 700 patents.

ROBERT GRIMSHAW.

Lathe Construction and Operation

Vielschnittbänke (Multi-Cut Lathes, Their Construction and Output). By Prof. Max Kurrein. 114 pages, 7 x 10 in., 164 illustrations. Guido Hackebeil A.G., Berlin, S14, Germany. Price 15 marks.

During the course of an extended visit to Germany and the continent of Europe in the latter part of 1928, the reviewer had the very good fortune to meet Dr. Max Kurrein, professor at the Engineering College in Charlottenburg, and head of the research work on machine tools. The ingenuity displayed by Dr. Kurrein in the way of studying machine tool operations, and the many practical results of his labors caused me to welcome this book.

Its 114 pages do not make a large book in the ordinary sense, but combined with the use of 164 illustrations it is at once evident that the author has made a moderately complete, or in any event well illustrated, book of it. It is not a theoretical book and does not contain a single formula, nor is it confined to German machines. Since the author has had considerable experience in America, machines made in this country take almost an equal place in the book with those from Europe.

Starting with a general discussion of these special lathes (which include turret lathes) and the work done in them, the author describes the development of their construction, the methods of applying the power, the different forms of beds, and the tool holders. In each case typical

drawings, with very clear sections and elevations, and photographs show clearly the meaning of the descriptive matter. The reviewer has never lost any of his admiration for the very accurate detailed drawings one finds in books from Germany, and this book is no exception, the drawings being an education even to those unable to read the German text.

Two very interesting tables may be specially mentioned, the first giving the leading dimensions of American and German lathes, and their gearing ratios, while the other gives the times required to complete certain automobile parts such as shafts, back axles, camshafts, pistons and crankshafts on the various lathes, the dimensions of the parts produced being given. Special mention may also be made of a drawing giving the complete gearing for one lathe, and many photographs and drawings show the arrangements of parts in detail.

The set-up of the tools for a number of pieces of work has been given, and sometimes comparisons are made of the way in which a given job would be handled in different machines. The book is undoubtedly valuable, well printed, and serviceably bound. Dealing with a machine of such vital importance in these days of mass production, it should find a place on many shop men's shelves.

ROBERT W. ANGUS.

How to Improve Cast Iron

Edelguss (High-Strength Iron Castings). A series of monographs edited by G. Meyersberg. 170 pages, 6 x 9 in., with 129 illustrations. Julius Springer, Berlin W9, Germany. Price 11 marks (paper bound).

Of recent years the literature on cast iron has been flooded with articles on a variety of ways to improve this material, to the bewilderment of many who seek to draw conclusions from the mass of data presented and who wish to apply the new methods in their daily practice. As most of the work has been done in Germany, there is the added uncertainty of imperfect translating and abstracting. Therefore, an authoritative collection and classification of the important monographs on the subject is greatly to be welcomed. The book in question is such a one and, while unfortunately not in English, it will serve as an excellent reference volume for foundry and other metallurgists acquainted with technical German.

The starting point of the whole development seems to have been made in 1920 when Karl Sipp called attention to a new line of castings made in the foundry of Heinrich Lanz, in Mannheim, Germany, and called "pearlitic cast iron" by him by reason of its characteristic microstructure. The principal characteristics of the process were the use of quite low silicon irons poured into very hot sand molds. Sipp's monograph is reprinted as the first one in the second series in this book.

In developing better quality cast irons, a number of investigations were made into methods that might be called "heat treatment" of the iron before pouring the molds. These led to several distinctive processes for bringing about the desired end. The book itself is divided into sections which recount the several methods that have worked out well from the practical standpoint. Another part covers the distinctive qualities of high-test cast iron.

After a series of papers on the scope of the research already done on cast iron, and the equilibrium diagram of high carbon alloys, the book next prints some accounts of the methods of production of high-test iron by the reduction of the total carbon, and with it also the graphite. One paper on this subject by Kleiber describes the Krupp method, and the second the Emmel method. Be it said here, that both papers carefully conceal the details of cupola melting, though highly praising the results obtained. However, both processes are known to be the

melting of practically all-steel scrap heats, with ferro-alloys added as part of the cupola mixture, the metal charges are very small and most carefully placed, plenty of coke is used, so that the drops of molten metal—a true synthetic cast iron—are superheated as much as possible. The American foundrymen will therefore have no difficulty in understanding the figures attained, as shown by the numerous tables of tests.

Next, the methods of production are described which are based upon getting the graphite into the smallest crystals possible, principally by aiming at the highest possible temperatures attainable by either direct melting in the cupola, or by duplexing of cupola metal in the air furnace or electric furnace (the air furnace using pre-heated air, which would correspond to the temperature of the open-hearth furnace). As may be expected, the first monograph on this phase is by Piwowarsky, whose name is now familiar to American metallurgists. Hanemann continues the series by a paper on his theory of the constitution of cast iron, which, it will be remembered, assumes that gray iron is a steel matrix with graphite dispersed through it.

A final section of the book contains detailed discussion of the properties of the new material, such as wear resistance, dimensional changes on repeated heating, electrical conductivity and its shock resistance. A study of the density of cast iron under the "color-pressure" test is also included. This is probably new to most American readers. A hydraulic press is used to force colored solutions into a carefully prepared test specimen, under standard time and pressures. The test pieces are then turned down in the lathe and the thin colored chips compared with the standard color and deductions made.

On closing the book, one cannot help but wonder that during the 450 years of use, the last 35 have seen nearly all the scientific progress that has been made in its production. Even so, hardly any change was made in the physical character of the castings. And yet here comes the epoch-making discovery of the existence of graphitic nuclei in ordinary melted iron, which when given proper heat treatment in this melting will lead to the production of cast irons with more than double the usual strength. One is tempted to wonder what is coming next. A compilation of authoritative research monographs, such as is this book on "Edelguss," forms a milestone in the progress of cast iron metallurgy.

RICHARD MOLDENKE.

A Pioneer Electrical Inventor

Thomas Davenport, Pioneer Inventor. By W. R. Davenport. 165 pages, 6 x 9 in., illustrated. Vermont Historical Society, Montpelier. Price, \$2.

In England, in 1831, Michael Faraday discovered that if a conductor was moved in a magnetic field, a current was produced, and that a magnetic field existed in the neighborhood of a current of electricity. By 1833, Professor Henry in America had made an electro-magnet which would "lift a common blacksmith's anvil." This magnet was bought for \$75 by a young blacksmith of Brandon, Vt., and without knowing any of the principles underlying it he immediately began to make larger "Chinese models" of this magnet, fix them to the rim of a wheel and to devise rudimentary commutators to control the exciting currents so the wheel would turn.

The present book recounts the succession of misfortunes which this untutored mechanic endured for the next twenty years, before he became utterly exhausted by his unsuccessful efforts to interest some person of means or influence in his new electro-magnetic motor. A working model was ready by 1834, patents were issued to Davenport in 1837, and in 1839 he was driving a cylinder print-

(Continued on page 413)



Impressions of Industrial Japan

In a Period of Fifty Years Has Come Acceptance of the Idea That Success Means Constant Study of Work of World Powers

BY DR. LILLIAN M. GILBRETH*

IN my brief stay in Japan, I visited only five cities: Yokohama, Tokio, Kyoto, Osaka and Kobe. Yokohama is by far the most modern of these cities and anyone who has visited only this

city has no real impression of typical Japan. The fact that it is a seaport city and that foreigners are constantly passing through it, even though they remain only a few hours, affects the attitudes of the men in business and industry and means that the articles manufactured and marketed are largely those which will appeal to the foreign buyer.

Tokio is much more typical of Japan. There is less English spoken when one gets off the well-beaten track and even the larger stores carry mostly articles intended for Japanese consumption. All through the city one finds small shops carrying on the old hand industries or doing work on preliminary processes which are carried to the factories for completion.

Kyoto is not so modern as Tokio and there is still a great feeling for craftsmanship and for the art of beauty which characterizes old Japan. It, like Yokohama and Tokio, is a center of distribution rather than of production. Osaka and Kobe are typical manufacturing centers, foreign in their feeling, and becoming foreign in their practice as rapidly as they can.

Finds Interest in Investigating Shoveling

In a steel plant visited everything was in a surprising state of tidiness, inside and out the plant, especially as I was not on one of the typical plant

visits but was the only guest. The engineer who took me through, who was the consultant, explained that much had been done to simplify work processes and increase output.

Here, as in all plants I visited, criticisms and suggestions were asked for eagerly and accepted wholeheartedly. It was typical that when the advantages of an intensive study of shoveling, to be built up on the work of Mr. Taylor and Mr. Gilbreth, was outlined the immediate response was a decision to make this at once and a promise to put a little tablet on the completed installation, saying that it was a result of the suggestion. It is impossible in an afternoon at a plant, spent in part in giving a talk for the executives and shopmen, to get an intensive knowledge of management or production methods. I had a feeling here, however, as in all the large plants I visited, that the procedure was rather from the individual work place and work method up to the general routing, planning, etc., than from the general to the particular.

No Absentee Management

My visit to the Tabi factory near Osaka, where the socks of Japan are made, was also only a half day's visit, with time out for a talk for the 3000 women and a short conference with the management before and after my trip through the plant. It was typical of all these Japanese industries that there was no absentee management. One met the chief men from the president of the company down, and while the fact that we were foreign guests and belonged to an engineering group no doubt gave greater assurance that we should meet such men, their intimate acquaintance with the problems of their industry proved that they spent much time in it. This did not mean that there was not a sharp line of demarcation between the white collar job and the overall job, but that at any rate if suggestions were made and thought valuable they could immediately receive the necessary approval and be put through.

Most of my time at the Tabi factory was spent in the department where the stitching was done. Here the machines were of late American models, excellently suited to the work

and well kept up. The consultant in charge had made a long and intense study of motion economy and was very proud of the fact that this installation was as complete and typical an example of motion study as he could make it. He had supplemented his short first hand observations of motion study installations in America and Europe by an intensive study of the literature. He was eager to hear of recent developments in this field and I felt more than ever sorry that because of pressure of work on everyone in the motion study field the literature is far behind the most recent practice. This means that material on the circular work place, skills, satisfactions, etc., has not as yet become available for Japanese use.

Saw Usual Variations in Speeds and Efficiencies

I noticed much variation in the speed and efficiency with which the work was done by the individual workers, but of course that is usual in this country also, for we have everywhere the problem of helping the mediocre to approximate more nearly the methods of the best. I noted too, as with us, the need to make it clear that speed is not synonymous with efficiency. The consultant is a psychologist, however, which means that the human element will always be considered insofar as this is possible. I was not able in this or in other factories to see the full swing of the working day of the workers, much less of the 24-hr. day. I did see something of the recreation facilities and those for eating. They seemed admirable.

The procedure of the visit to this factory was like that of them all, a welcome from the chief executive, tea and a request for impressions and criticisms. A glimpse of a few of the group activities or the places where they were held, then a talk, running anywhere from 10 min. to an hour, including the translation, then a trip through the plant or those parts of it thought by them specially interesting or which I had asked to see, then more tea, the criticisms and comments on them, one or more gifts or souvenirs, and the formal farewell. All this consumed so much time and

*Special correspondent for THE IRON AGE to the World Engineering Congress in Japan. Dr. Gilbreth covered the general features of the congress in the issue of Jan. 16 and discussed the industrial management movement in Japan in the issue of Jan. 23.

effort on the part of the hosts that one left hoping they might find it all in some way profitable.

In a trip through a match factory, I was surprised to see so much of the work still being done by workers seated on the floor, but of course it is not possible to compare the fatigue they get from that posture with that that our workers would get from it, since they have been accustomed all their lives to doing without chairs. There was much interesting machinery in this factory but the problem of technological unemployment does not seem to be as yet an important one. The ease and rapidity with which a hand process has become a machine process is typical of what one may expect to see in Japan. The hand workers seem to shift to machine tending jobs and one sees the same beautiful graceful and effective motions. We have always believed that right motions would insure right quality of product and certainly what I saw in Japan more than confirms this belief.

Visited Technical Schools

I was very fortunate in having opportunity to see typical schools of most of the type which affect industry. The Imperial University at Tokio is typical of the school for engineers. On the afternoon that I visited it the students had been gathered for protracted hours to listen to foreign speakers from the engineering congress. This they did with a patience, courtesy, attention and apparent interest which was fine to see. The speeches were given in English without translation, were extremely varied in subject and technic of presentation, but were all followed with apparent ease.

In two of the technical schools of Yokohama I saw both the commercial and the industrial students. The former were preparing for business, hence had a rigid training in English and required no translation; the latter were given much less English and a translation was necessary. The group seemed equally interested in the principles of modern management and their application.

Courtesy in Shops and Public Places

I had excellent opportunities to visit two of the largest department stores in Tokio, as one of my friends was a consultant in one and I had a letter of introduction to the manager of another. In both I find the technic of selling and of meeting the needs and tastes of the customer very highly developed. I found planning departments and did not see a training department, though I was told such existed.

I was greatly impressed with the efficiency of the banks which I visited, which so closely copy best accepted bank customs in this country that only an expert could note the differences. Here as in the stores and factories and in fact in all the industrial business and other places where com-

munity life goes on all through Japan, we found the most exquisite and patient courtesy.

The same thing can be said of the waiters and other personal attendants, and of the personnel on the railroads and other means of transportation. I had thought at first that this was a special procedure intended as a welcome to our World Engineering Congress group, but after the sessions were over, I spent a week in Tokio going everywhere, even into the slums, and found the same courtesy to me and to each other.

Need More Care for Physical Conditions

As to physical conditions in Japan as they affect industry, the problem of light and of eye fatigue still needs much attention. Electricity is available everywhere, so there is adequate light, but as too often with us, little consideration of glare caused by high finish on machinery, sharp contrasts, like black and white, etc. As with us, problems of heat and cold, moisture, noise, dirt, vibration, etc., need more consideration. The problem of moisture is a specially serious one, as Japan has a great deal of rain, and a hatred of flying dust means that streets and shops are sprinkled often and all too thoroughly between showers. Everywhere I saw an attempt to make the worker not only efficient but comfortable in his surroundings and certainly as soon as we furnish a good example, this will be copied.

The American manufacturer should remember the smaller size of the Japanese as compared with our worker and make machinery and equipment accordingly. The strength, agility, dexterity, sense acuity and endurance of the workers are wonderful. The posture of course is affected not only by the restricting clothing, but by the custom of sitting on the ground.



As for emotional traits I should say that my observations rate the Japanese very high. I saw everywhere control and nervous stability even on jobs which would have made clear any lack; patience, endurance, cooperation, friendliness toward fellow-workers and the management were everywhere apparent.

Show Notable Workmanship Ability

All these things mean much to American industry. We may be sure that no matter how fine the materials we send over, they will be handled with dexterity, care and appreciation, and we may look for in materials which we import from them exactly as fine quality as we demand. They have it; they will send it if we ask for it. Cheap stuff will only come to us if they feel that is what we want.

It must be remembered that this is distinctly an interim period for Japan. They are only fifty years old industrially. They have accomplished much by a whole-hearted acceptance of the idea that in order to succeed they must be like the great world powers. To be like them meant to copy and they have done this as far and as fast as they could. Now they realize that the important thing is to measure and they are doing such research as no one who has not been there realizes. With this research and the application of the results to the solution of their problems will certainly come rapid progress.

We can help most by educating them when they desire it, but especially by educating ourselves so that we can be better examples. We can demonstrate, illustrate, cooperate and be patient. If we do all these, we shall have in Japan a nation with whom we all may be proud to do business. Even without our cooperation she is bound to come to the fore, but for our own sake, as well as hers, it is important that we preserve that friendliness which at present exists and which the World Engineering Congress certainly did much to increase.

The mineral resources of the United States, including the production of iron ore, pig iron and steel in 1928, have been covered in a bulletin of 40 pages of the Bureau of Mines. It contains tabular matter regarding production, prices and various other features connected with the operations of iron mines and the iron and steel plants. There is a list of the largest iron ore producing mines in the United States; a total of 124 in 1928 exceeded 100,000 tons each, with the maximum going above 5,000,000 tons and the first 10 above 1,000,000 tons each.

Henry Prentiss & Co., machine tool dealers, who have been located for many years at 149 Broadway, New York, have leased space in the new Chrysler Building, Forty-second Street and Lexington Avenue, and will move May 1.

Offers Facilities for Heat Treating

Connecticut Company Establishes a Commercial Laboratory for Steel and Other Alloys

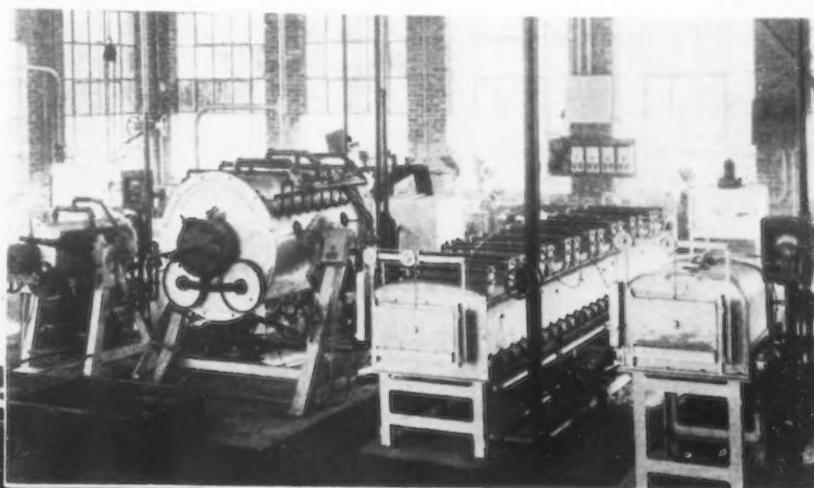
THE Stanley P. Rockwell Co., Hartford, Conn., which for a number of years has been prominent in the design and manufacture of heat-treating and testing apparatus, has extended its business into a broader field. It has erected a building which includes a special department equipped with heat-treating furnaces to take care of special heat-treating problems, particularly for small users, in addition to its regular line of business.

For hardening either long or short work, there is an American Gas oven furnace. Its hearth is 16 ft. long and the roof can be removed in sections, so that the material to be heat treated can be put in the furnace through the top or at either end. The

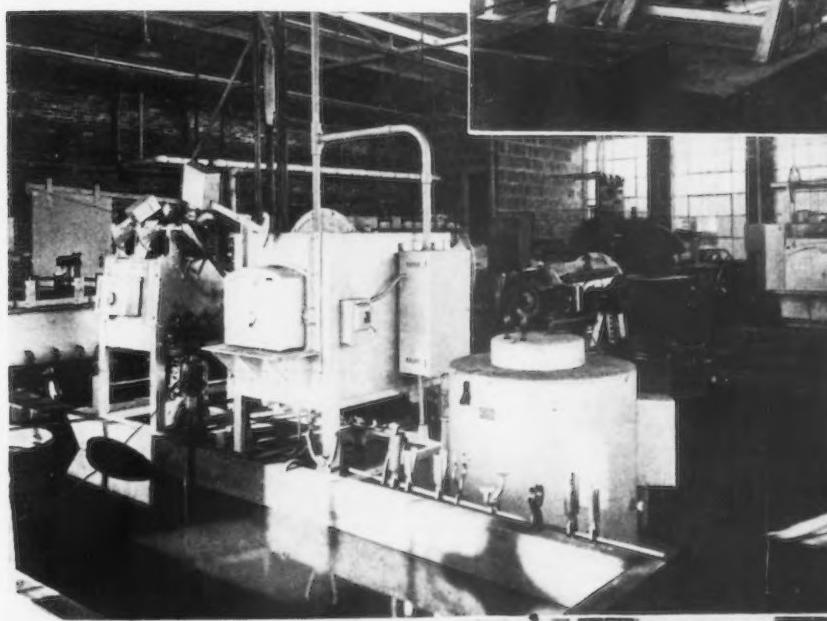
high-speed furnace which is equipped with carborundum slabs and will give a maximum temperature of 2500 deg. Its temperature is controlled by an American Gas heat controller; a Rock-

controlled by Wilson-Maeulen controllers. In addition to handling pre-heating work, the furnace is used for general tool hardening.

The heat-treating plant also has a No. 85B American rotary furnace for carburizing and, for heat treating small parts in large lots, a No. 1A rotary furnace and a No. 51 rotary tempering furnace. The rotary furnaces are of the tilting type discharging material directly into quenching

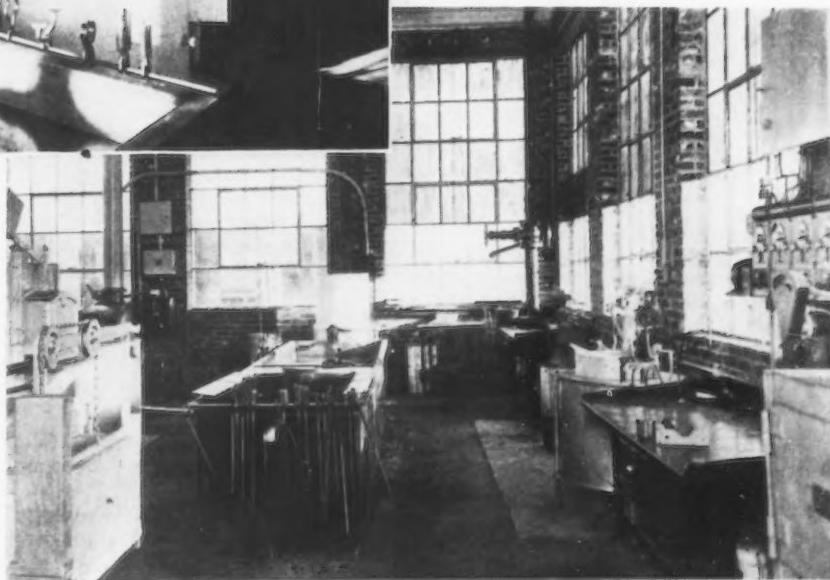


HEAT-TREATING Furnaces Are All Gas-Fired. Movable quenching tanks lie in the foreground. The long rectangular furnace has a roof, removable in sections (above)



A Battery of Heat-Treating Electric Furnaces for Special Steels and Special Treatment (at Left)

One Corner of the Laboratory Where Special Equipment Is Arranged (Below)



burners are arranged in three sections with the temperature controlled independently for each section by means of Wilson-Maeulen controllers and American Gas valves operated by solenoids. Any one or two of the three sections of the furnace can be used independently of the remainder by putting in a bridge wall. The furnace is served by a hand crane running on a monorail, this arrangement being especially convenient for loading the furnace through the top. The furnace is intended primarily to handle long work.

For nitriding steel parts the plant has a No. 4 American Gas furnace equipped with an auxiliary set of burners to allow it to operate at a temperature of about 900 deg. Fahr. This furnace also can be employed for small carburizing and for general heat treating by removing the retort and using the main burners, which are designed to provide a temperature of 1800 deg.

High-speed tool steel is treated in a

well dilatometer can be attached. It has an individual motor-driven blower set in the base.

Material which is to go into the high-speed furnace is preheated in a General Electric RRB-15 electric furnace equipped with a time switch for night operation. This furnace has a hearth 15 in. wide and 30 in. long and the temperature is automatically

tanks in front of the furnaces. The quenching is done in either oil or water, and the oil quenching tank can be moved by hand from one furnace to another.

A General Electric lead pot, 12 in. in diameter and 18 in. deep, is used for the local hardening and lead quenching of high-speed steel. Large dies, rolls and forgings are carburized

in a General Electric RRB-36 electric furnace rated at 72 kw. A General Electric air-drawing oven for drawing tools and small parts up to 750 deg. has a circulating fan to insure uniformity of temperature and to speed up the tempering process. For precision heat treating of tools, dies and gears a Rockwell Sentry pit-type furnace equipped with dilatometer, is

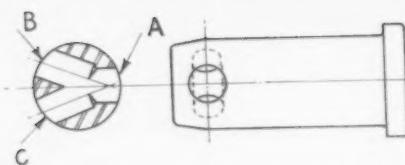
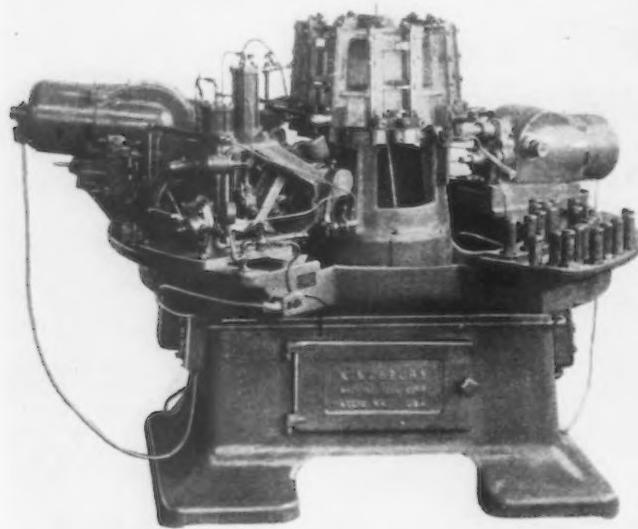
employed. Cyanide and salt bath treatment is given in a cyanide pot 12 in. in diameter and 18 in. deep. Tools are tempered in an oil tempering vat of a capacity of 600 lb. per hr.

The company's new building contains also metallurgical and chemical laboratories. The Rockwell dilatometer and quenching tank agitator are manufactured in the machine shop.

Machine Arranged to Drill Cotter Holes in Cooke Pins

COTTER pin holes in Cooke pins are drilled automatically on the machine illustrated, built recently by the Kingsbury Machine Tool Corporation, Keene, N. H. The Cooke pin, a recent development, is used espe-

cially by railroads as a brake pin. nearest this head, the spindle extension and head are placed on an angle of 5 deg. with the machine table. The pins are, therefore, placed in the turret on a 5-deg. angle with the turret axis.



cially by railroads as a brake pin.

As shown in the line sketch, three holes are drilled, so that a cotter pin driven into hole A, will spread automatically when striking the sharp edge formed by the intersection of the holes B and C. A small shoulder is left at bottom of B and C, so that a cotter pin cannot be entered into either of these holes.

The drilling machine is made up of an automatically indexed turret and three Kingsbury No. 30 automatic drilling heads. Chips and coolant fall through the open table center into a chip pan inside the cabinet base, which is open at the rear for chip removal.

The turret indexes to the left. Hole A is drilled by the first head beyond the loading station. This head has a spindle extension passing through the turret base and drills the hole from inside the turret. In order to clear the pins on the side of the turret

THE Three Holes in Cooke Pins, Used by Railroads as Brake Pins, Are Drilled Automatically on a High Production Basis. The pins range from 1 to 2½ in. in diameter and from 2½ to 12 in. in length.

The pins are clamped in V-blocks, the screw of which is operated by a detachable wrench. This screw, placed some distance above the end of the pin being drilled, will not take the thrust of the inside drill when drilling hole A. At this station, therefore, an external clamp lever is used. An air cylinder acting through toggle levers operates the clamp lever. This mechanism is designed as an individual unit.

Holes B and C are drilled by two heads located at subsequent working stations on the machine table. These heads are mounted on angular adapter plates, so that the three drilled holes will be in the same plane, square with the axis of the pin. To prevent

the converging point of the center lines of holes B and C varying with respect to the turret center when drilling different diameter pins, these two adapter plates are adjustable on the machine table.

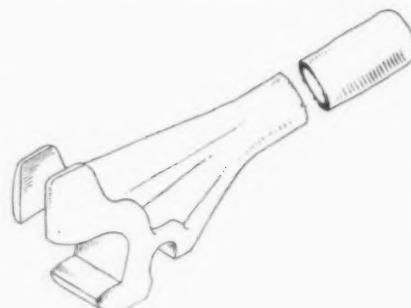
Each turret station consists of a fixed V-block in the lower position and two V-blocks adjustable vertically to gage the pins from under the head. These blocks slide in vertical ways, carried on two threaded studs. Small pinions are pinned to the upper end of these studs and block adjustment is obtained by meshing a piloted gear with the pinions.

Automatic indexing of the turret is obtained by means of a Geneva mechanism operated by a motor-driven friction clutch inside the cabinet base.

Synchronization of the turret index, lever clamp, and spindle stroke is obtained by compressed air through a series of regulating valves, enabling the operator to run the machine either full or semi-automatic. When operation is semi-automatic, the turret will not index until the operator trips the control valve. When operating full automatic, obtained by leaving the control valve in the "on" position, the turret indexes as soon as all spindles have completed their strokes and returned to their starting positions. Upon completion of the index, further motion of the Geneva shaft opens a valve to the clamping cylinder. The motion of the lever clamping the pin and locking the turret opens the trip valve to the drilling heads. The spindles cannot feed when the turret is not in the locked position, and the turret will not index until all drill spindles are in their returned position.

Safety Fork to Handle Steel Rails

A SAFETY rail fork for handling 75-lb. and heavier rails has been brought out by the American Fork & Hoe Co., Cleveland. The head is an alloy steel casting and the handle a section of tubing. The head is so designed that it will grip either the ball, web or base of the rail securely, and in such a manner that the op-



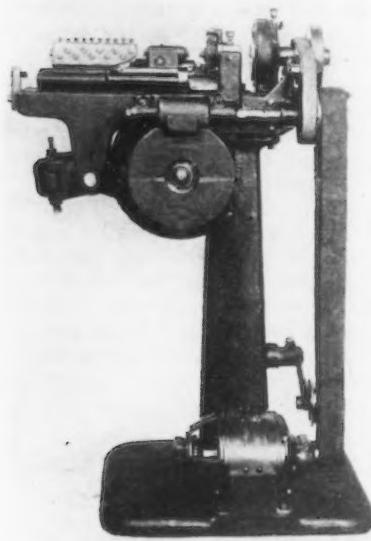
erator can in every case turn the rail away from himself. As the rail passes the balance point the fork is automatically released. The tool weighs about 12 lb. and is 40 in. long over all.

Taper Pins Produced Rapidly on Special Swager

IN making small taper pins on the special swaging machine here pictured, wire is taken from the coil, straightened, the taper swaged and the pins cut to length, the process being entirely automatic. Production is at the rate of 35 pins a minute.

Wire from 0.020 in. to 1/16 in. can be used, and pins up to 1/2-in. long can be swaged and cut off. The small end of the pins can be rounded if required.

The machine, built by the Langelier Mfg. Co., Providence, R. I., consists of a pedestal base and a frame, on



Taper Pins Up to 1/2-In. Long Are Produced Automatically from Wire Taken for Coils. Production is at the rate of 35 pins a minute

one end of which there is a small swaging head. The remainder of the top of the frame has a dovetail slide upon which the shearing, feeding and straightening heads are reciprocated by means of a double cam under the frame. The feeding and straightening heads are coupled together and act in unison, the shearing head being actuated by the feeding head, and its travel controlled by adjustable stops.

The feeding mechanism is made up of a double cam that actuates a pair of cam levers connected to a pair of segment gears that mesh with racks located in the dovetail slide. One of the racks is connected to the feeding head, and the other to a wire pinch-lever in the feeding head. The cams are driven by a worm and wheel. The worm-shaft is belt connected to the 1/2-hp. motor at the base of the machine. A secondary pulley on the worm-shaft is belt connected to the swaging head pulley and runs it at 900 r.p.m. The cam levers and segment gears have their fulcrums on the same shaft, and are connected under spring compression against a positive stop.

The two paths in the double cam

are the same excepting that an additional rise is given to one to actuate the wire pinch lever that grips the wire and feeds it ahead for each length of pin.

Shearing of the pins is accomplished after swaging by a pair of shearing bushings, one fixed in the shearing head, and the other in an oscillating segment gear that is actuated by a cam in the worm-wheel. An adjustable stop at the rear end of the machine controls length of wire to be fed forward at each cycle. The swaging head is adjustable axially, and controls the length of taper on the pin.

Floor space of 2 x 3 ft. is required for the unit, which weighs approximately 900 lb. Other sizes can be made to take larger wire and swage longer pins.

Utility Press for Shops and Toolrooms

FOR bending, straightening, pressing and other operations in machine shops and toolrooms, the Simplex Tool Co., Woonsocket, R. I., is offering a new general utility press.

The plunger of this machine is actuated by a ratchet and handle as shown. Three working speeds are available by means of a simple adjustment, the lowest speed having a power of 4000 to 1. The ratchet wheel is mounted in ball bearings to facilitate spinning the plunger to and from the work. Five height adjustments of the table are provided. Material up to 1/4 x 4 in. can be bent to a 90 deg. angle and sufficient pressure is available to straighten a 3-in. diameter shaft.

Travel of screw, which has a 4-pitch thread and is 1 15-16 in. in diameter, is 8 in. The height of the

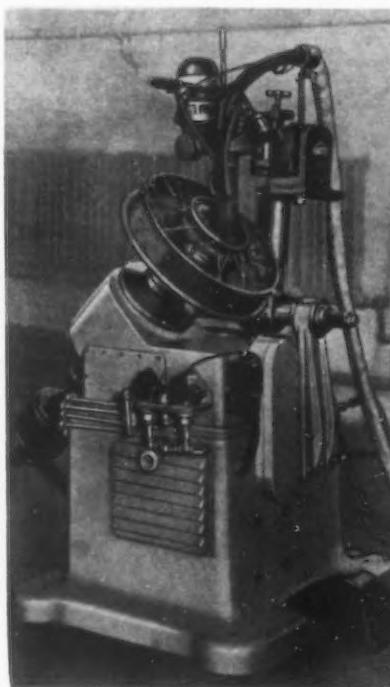


Bending, Straightening, Pressing In and Out, and Other Operations May Be Performed Rapidly

press is 60 in. overall, and the width between the uprights is 21 in. Equipment includes two combination blocks, which are used as parallels, straightening V's, and bending dies; a V-nose for straightening and bending; a plain nose and a bar.

Automatic Welding of Round Stampings

CARBON arc welding embodying the principle of the "electronic tornado" is utilized by the automatic



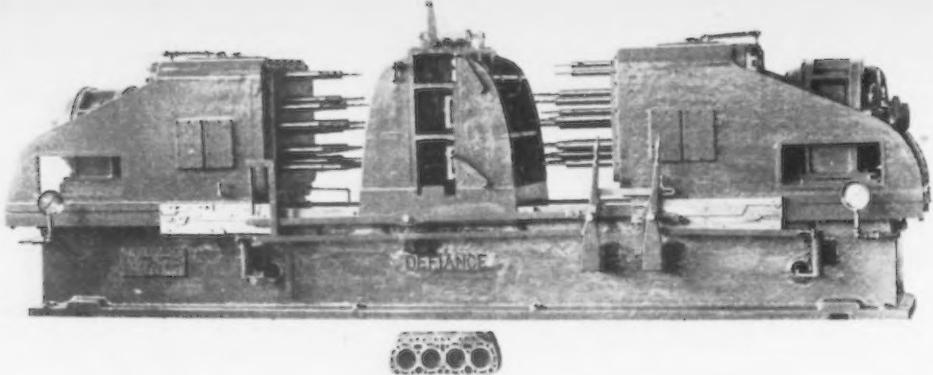
Carbon Arc and Electronic Tornado Used to Weld Circular Stampings Into Hubs of Motor Car Wheels

machine shown in the accompanying illustration. As introduced recently into the automotive industry by Lincoln Electric Co., Cleveland, it is used in the manufacture of hubs for wire wheels. Its purpose is to make a lap weld joining the inside of pressed steel parts forming the hub, as the wheel turns in a jig. Welding time for an 8-in. hub, shown in the illustration, is 40 sec., and the floor to floor production of this size wheel is 50 per hr.

The application of the carbon arc welding process in this machine is unique. No metal filler rod, such as generally is used in automatic welding, is necessary. The metals of the hub are fused together as they rotate in the jig.

In joining these pressed steel parts, the carbon arc welding process is claimed to secure the strength and rigidity that might be had by forming all these parts from one piece of metal. The smooth well rounded bead produced by this process also gives the hub of this wheel the appearance of a homogeneous steel unit.

Virginia Iron, Coal & Coke Co. reports a net loss of \$24,018.95 for 1929.



Opposed-Head Drill for Engine and Other Parts

FOR production drilling of cylinder heads, motor blocks, transmission cases and similar pieces, the Defiance Machine Works, Defiance, Ohio, has brought out a new opposed-head horizontal multiple-spindle drilling machine. Heads and fixtures are built to suit requirements, the machine illustrated having 77 spindles in the two heads. One head is driven by a 30-hp. motor and the other by a 40-hp. 1200-r.p.m. motor, direct connected by flexible couplings.

Drill heads have heat-treated alloy steel spindles, mounted either in bronze-bushed or anti-friction bearings, as desired. The spindles are driven by stub tooth gears which are inclosed and oiled continuously by force feed. The fixture is of three-station design and as the cylinder head progresses from the first to the third station, it completes the drilling of all holes with one cycle of the ma-

chine. A heavy jig plate is mounted on each side as part of the fixture.

Two Oilgear pumps, one for each head, drive each head independently, but mechanical screw feed with rapid traverse movement can be supplied in place of the Oilgear hydraulic feed, if desired. One head travels in advance of the other by drilling through the center and starts to reverse before the second head reaches the center, as several of the holes are sometimes drilled clear through on many jobs. The stroke of each head is 24 in., with rapid traverse forward, then the desired rate of feed while cutting, and with automatic kick-off and automatic return movement. Heads have ample travel away from the fixture for removing and changing cutting tools.

Floor space of 17 ft. 2 in. by 5 ft. 1 in. is occupied by the machine, the net weight of which is 27,500 lb.

Completes Line of Planer-Type Millers

WITH the new 30 x 30-in. machine here pictured, the Cincinnati Planer Co., Cincinnati, is offering a

complete line of planer-type milling machines.

Several improvements are incorpo-

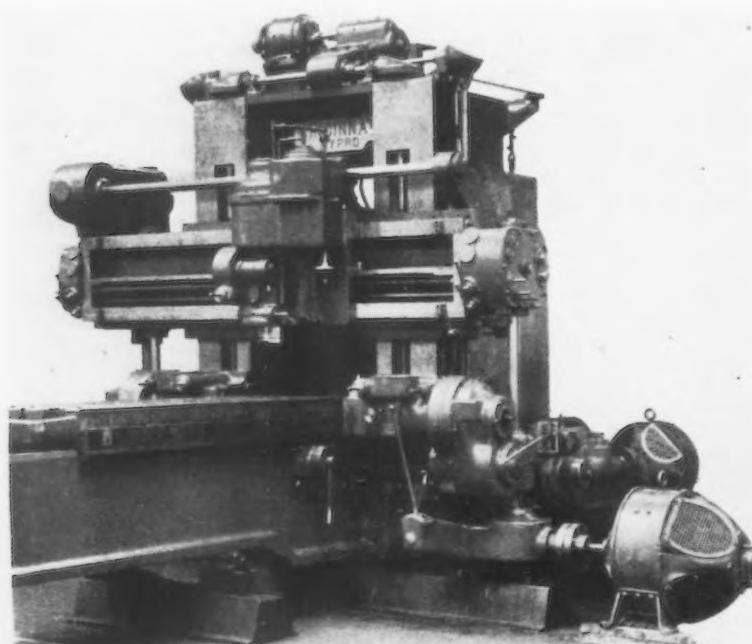


Table Feed and Rapid Traverse Are Controlled by One Lever

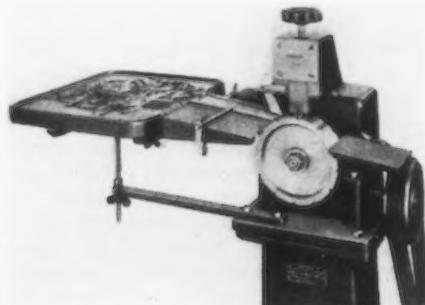
FLOOR - TO - FLOOR Time in Drilling the Cylinder Heads Is 4 Min., Including Loading and Unloading Time. The machine has 77 spindles in the two heads

rated in the new machine. One lever operates the table feed and the rapid traverse, the arrangement being such that the feed and the rapid traverse cannot be engaged at the same time. For feeding, this lever engages the feed to the head as well as to the table. Direction of feed is controlled by direction of motor, or with reverse feed mechanism on each side of the head and on the end of the rail for the rail head.

The drive to the spindles has been placed on the right-hand side for the side heads and on the left-hand side for the rail heads. All drive shafts are equipped with spiral bevel gears, are mounted in Timken roller bearings and run in oil.

Production Marking Machine for Small Parts

CYLINDRICAL pieces ranging from $1/16$ to $\frac{3}{4}$ in. in diameter and from 1 in. to 4 in. long may be marked rapidly on the power-operated



Tie Rods, Straight Shank Drills, Roller Bearing and Similar Small Parts Are Marked on a Production Basis

marking machine illustrated, brought out by the Noble & Westbrook Mfg. Co., East Hartford, Conn.

The machine is arranged for motor drive, the dial being driven through worm and worm gear which run in oil. A loading platform with an inclined surface to bring the work to the marking dial is provided. For small work a pick-up dial, which brings the work straight across the dial, is used, this type of dial being made in a number of sizes for work of different sizes. Larger work can be marked without the pick-up dial. Feeding the machine consists of keeping the inclined plat-

Recovery in Building Expected by Mid-Year but in Automobiles Somewhat Later

BY LEWIS H. HANEY
DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

BUILDING and automobile production are the two key industries. They are basic in the demand for steel, copper and glass, and are highly important factors in lumber and textiles—to say nothing of labor. As they go, so goes industry in general. What, then, are the facts with reference to these industries? What is the outlook?

The December average daily production of cars and trucks was approximately 5020, which is not quite 42 per cent of the monthly average during 1921-1927. Allowing for a usual December decrease of nearly 19 per cent, this gives an adjusted index of 61, which compares with 93 in November and 117 a year ago. Considering the season, the December rate was the lowest since November, 1927, in which month automobile production touched the bottom of the 1927 recession and reached the lowest level since March, 1922.

Measured in floor space, construction contracts awarded in December amounted to a little over 44,000,000 sq. ft., or 69.6 per cent of the 1921-'27 average. Usually construction contracts fall by nearly 14 per cent in December. After allowing for that percentage we get an adjusted index of 81.5, against 86.4 in November and 120.7 a year ago. This is about the same as the bottom reached in August, 1924. Building permits were the lowest since 1921.

Usually automobile production gains about 10 per cent in January. Thus far, however, it is doubtful if such recovery has occurred. Increased automobile schedules have been rather tentative. It is generally admitted that the export market for automobiles is not favorable, owing to economic unsettlement in several foreign countries.

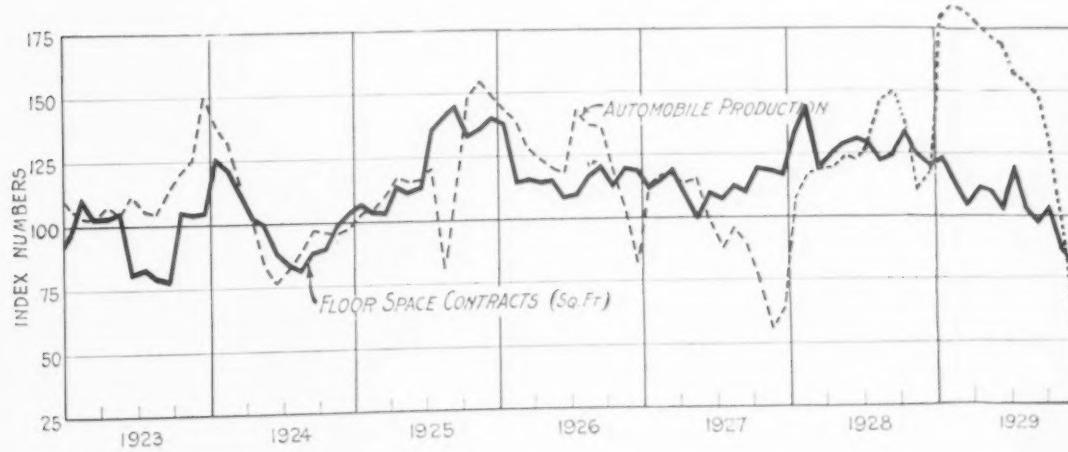
Weekly awards of fabricated structural steel are rather low, and inquiries are decidedly so. Awards of reinforcing steel may also be called light. Here, however, some good inquiries are reported, which may well reflect the anticipated improvement in construction and notably in road building.

Automobile curtailment has gone far toward correcting the over-production of 1929. In December, it was about as much below normal as it was above normal at the peak. It is below its average relation with the building activity curve. Will it not require a considerable period of stabilization and readjustment before a sustained recovery can develop—perhaps a period of 7 to 9 months? As yet, the production curve has been well below normal for only three months.

Builders are now paying for the excessive construction of 1925, 1926 and 1928. The trend, however, has been downward since February, 1928, a period of about two years, and activity is below both the theoretical normal and the average for the years 1921-'27. Money rates are moderate and, while not likely to decline much during the next few months, will ultimately reach lower levels. The bond market appears to be convalescent, and is being increasingly tested with fair results.

We may conclude that building should take the upward grade for a sustained recovery around the middle of the year, but is likely to show little increase and to remain dull and irregular meanwhile.

Doctor Haney in the next number will discuss the activity in steel consuming industries in general and leave for the Feb. 13 number the situation respecting commodity prices.



The Most Hopeful Feature Lies in the Low Levels to Which Building Activity and Automobile Production Have Fallen

This Issue in Brief

Weld testing by visual methods proves unsure. Even experienced welders have a poor record in differentiating between sound welds and faulty, if not familiar with the method by which the weld was made.—Page 369.

Predicts normal sales condition for automotive industry in 1930. Cram, automobile statistical authority, looks for output of about five million cars and trucks, but says sales peak will come later this year than normally.—Page 361.

Billet-chipper may be displaced by new machine for cleaning billet surface. Resembles an open-side planer. Will remove a 5-in. strip of steel, to a depth of 1/16 in., which will remove 90 per cent of the defects.—Page 366.

Idle industrial power and industrial migration will be features of new census. Data will also be collected showing to what extent manufacturers sell through wholesalers.—Page 383.

Favors bolt-and-rivet construction for airplane wings. No welding used in construction of Sikorsky "amphibion" wings. Metal structure is used for wing framework.—Page 362.

Aircraft builder cadmium-plates all steel parts, to guard against corrosion. After plating, they are painted with red oxide. Parts with hollow sections are dipped in linseed oil as a precaution against any chance of the plating solution remaining in crevices.—Page 364.

Uptrend in building will begin about middle of the year, Dr. Haney predicts. In meantime, building is likely to show little increase.—Page 379.

Novice welder, with proper voltage and current, can make a better weld than an expert operator when current is insufficient. Adequate current is an essential to good arc welds.—Page 369.

No absentee management in Japan. Chief executives, from president down, manage their own plants and reveal an intimate knowledge of the problems of their industry.—Page 373.

Extreme accuracy necessary in heat treating strong aluminum alloys necessitates use of electric heat. Maximum properties are developed within a heat range of about 10 deg. Fahr. Overheating ruins the alloys.—Page 360.

Kerosene test proves effective for testing soundness of welds. It is a positive test for porosity, but cannot be depended upon to indicate the strength of the weld.—Page 369.

Marked ability to change quickly and easily from hand process to machine process speaks well for industrial future of Japan. Though only fifty years old industrially, Japan has accomplished much by whole-hearted acceptance of the best methods in use in other countries.—Page 374.

Heat treating economy promoted by continuous furnace. Cold load needs considerable heat, rate of absorption diminishing rapidly as temperature rises. Batch furnace must therefore be powered high enough for initial heat absorption. In continuous furnace each zone does the same part of heating and can always operate at 100 per cent capacity.—Page 358.

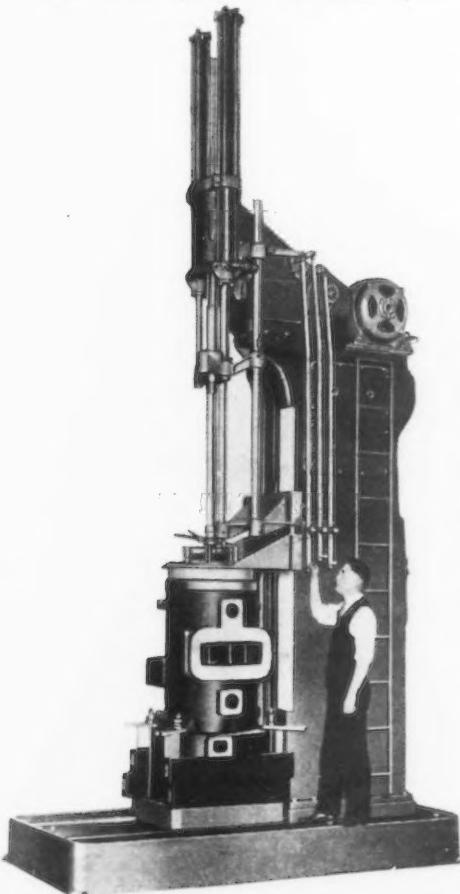
Distribution census is under way. A specially organized force will survey cities over 10,000 population. Smaller towns and rural districts will be covered by population census takers.—Page 383.

Business recession will end in 30 to 60 days, says economist. Professor Bullock of Harvard looks for a spring upturn, but concedes that it may not be in the full seasonal volume.—Page 385.

form filled from the horizontal loading platform, the operator sorting out the work, which then rolls down the incline by gravity and is picked up by the feeding dial, passed under the die and dropped off automatically. Production depends on the size and shape of the work.

Honing Machine for Diesel and Other Large Cylinders

FOR honing large and comparative-
ly long cylinders, such as Diesel engine, air compressor, steam, hydraulic, oil and gas engine cylinders, the Barnes Drill Co., Rockford, Ill., has developed a large vertical honing machine having a hydraulically reciprocated spindle. Railroad cylin-



Large Cylinders Reamed to Within 0.005 to 0.008 In. of Size Are Honed to an Accuracy of 0.001 In.

ders, such as power reverse, air brake and cross-compound cylinders, may also be honed on the machine.

In addition to unusually high quality of finish, rapid operation is a feature of the machine. Large cylinders reamed to within 0.005 to 0.008 in. of size may be honed to an accuracy of 0.001 in. Where length permits, honing by the vertical method is said to result in economy of floor space, greater convenience of handling, and the advantage of a free suspending of the hone from a full-floating driver.

The machine has 36-in. swing and hones cylinders up to 20 in. in diameter and 54 in. long. A 3-in. ten-splined spindle with 56-in. stroke is used. Other lengths of stroke and shorter

or longer column can be supplied. Spindle and hone assembly are balanced by an air counterbalance on which patent claims are pending. The work-carrying table rolls in and out on ball bearings by means of an air cylinder, thus facilitating loading and unloading of heavy cylinders. Eight quick-change spindle speeds are furnished. Radial ball bearings and Timken roller bearings are used throughout, the spindle being carried in Timken bearings. All bearings are self-oiling.

The reciprocating and rotating ten-splined spindle is hydraulically controlled as to length and speed of stroke. An Oilgear pump with special 3 in 1 valve control is used, and duplex hydraulic cylinders, with duplex torque bars and bracket to eliminate vibration, are features. The cycles of reciprocation may be changed to suit requirements by means of the volume regulator control on pump. The length of stroke may be set for

overrun of the hone at each end of the cylinder, a feature emphasized as preventing bell mouth, barrel shape or taper. A combined control lever is employed. A latch on this lever permits reciprocating without rotating the spindle, or rotating without reciprocating the lever.

Specifications include: Height of standard machine, spindle up, 18 ft. 8 in.; distance from center of spindle to face of column, 18 in.; maximum distance from top of table to nose of spindle, 10 ft. 6 in.; working surface of table, 30 x 30 in.; and horizontal travel of table (in and out), 30 in. The eight spindle speeds, with 2 to 1 crown gearing ratio and drive shaft at 400 r.p.m., are 128, 180, 250 and 354 r.p.m.; when back-gearred, additional speeds of 32, 45, 63 and 89 r.p.m. are obtainable. A 20-hp. 1200-r.p.m. motor is employed. Floor space occupied is 58 x 117 in.; the net weight of the machine is approximately 12,000 lb.

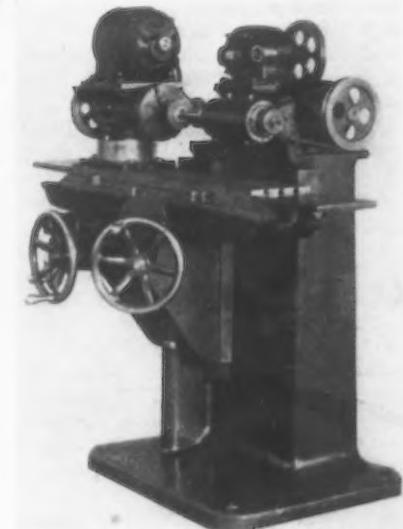
New Internal Grinder Has Face Grinding Spindle

A N internal grinder having two in-
ternal grinding spindles, one
heavy-duty and one high-speed, and a
heavy-duty face grinding spindle has
been brought out by the Jarecki Ma-
chine & Tool Co., Grand Rapids, Mich.

The machine will grind internally
from $\frac{1}{2}$ to 10 in. in diameter, 4 to 10
in. in length, with precision. It will
face grind up to 12 in. in diameter.
Work to be ground may be clamped to
the faceplate or held in the $7\frac{1}{2}$ -in. in-
dependent four-jawed chuck furnished.
The head is arranged so that it can be
set at any angle desired. Spindles are
individually motor driven, a $\frac{1}{2}$ -hp.
1750-r.p.m. motor being used for the
internal grinding attachment and face
grinding attachments and a $\frac{1}{4}$ -hp.
850-r.p.m. motor for the head. Al-
though designed as a hand-feed ma-
chine, the grinder can be furnished
with power feed.

Self-aligning ball bearings are em-
ployed for all spindles, including the
chuck spindle. The heavy-duty in-
ternal grinding spindle is equipped
with four quills, ranging from $2\frac{1}{2}$ to
10 in. long. Speeds range from 2600
to 5200 r.p.m. The light-body grind-
ing spindle is furnished with three
quills ranging from 2 to 6 in. long.
Speeds of this spindle range from
10,000 to 15,000 r.p.m. The face grind-
ing spindle operates at 5600 r.p.m.; it
has three quills, ranging from 2 to 8
in. long. The chuck spindle speeds
range from 80 to 240 r.p.m.

Vertical movement of the bed is 12
in., longitudinal movement 24 in., and
transverse movement of the bed is 10
in. The height to the spindle centers
is 47 in. Floor space occupied by the
machine is 48 x 66 in. The weight,
complete, is 2400 lb.



Work May Be Mounted on the Faceplate or in a Chuck. Grinding spindles and head are individually driven

Large Testing Laboratory for Columbia University

Plans for a materials testing laboratory containing a 3,000,000-lb. capacity universal testing machine, have been announced by Dean George B. Pegram of the engineering school of Columbia University, New York.

The foundations and steel work of the laboratory will be designed for a building which ultimately will be 14 stories high, and provide 9000 sq. ft. per floor. The new testing machine will test specimens 35 ft. in length and will have a width under the loading head of more than 6 ft. In the building which will house it, a hall more than two stories high will be needed to accommodate the apparatus and the traveling crane to be used in handling the material to be tested.

The Columbia testing laboratories cooperate with various New York city and State agencies having supervision over construction work. At present the maximum load capacity of the largest testing machine in those laboratories is 400,000 lb.

Permanent Construction Committee

Research, Advertising and Financing Feature Washington Program—Executive Committee Is Optimistic

WASHINGTON, Jan. 28.—Specific action looking to the maintenance of sound business conditions was taken by the construction and allied industries at a meeting here on Monday of last week when it was decided to organize a permanent committee, composed of representatives of 67 key industries, and raise a fund of \$500,000 to carry on a nation-wide advertising and educational building campaign. The meeting was held at the Chamber of Commerce of the United States, and was directed toward furthering the movement instituted by the National Business Survey Conference of the chamber.

The committee is being organized by Fenton B. Turck, Jr., vice-president of the American Radiator Co., who expressed the opinion that conditions at the present time are favorable for construction work of all kinds, and also for home modernization. Representatives of building and loan associations who attended the construction conference reported that conditions in their particular fields have shown a distinct improvement in the past 30 days. From other sources the committee was informed that building loans made recently have exceeded expectations. It was the sense of the conference that one of the difficulties confronting the industry has been the stringency of building funds, and one of the major activities of the permanent committee, headed by Mr. Turck, will be devoted toward making building loans more readily available.

Reports of Business Survey Committee

The executive committee of the National Business Survey Conference, at a meeting last Thursday, received reports from business and industry throughout the country, showing the status of production and consumption up to mid-January, and said the figures were all encouraging. A summary of the results of its deliberations was presented to President Hoover when the committee called at the White House. According to a statement issued on behalf of the committee, the situation has become so close to normal that no unusual methods need be considered for the stimulation of business beyond the progressive policies which ordinarily mark American industry.

It was stated that facts show that the abnormal recession in the final months of 1929 has left no major problems, and that there are now evidences of growing activity, with the current situation favorable.

In the absence of Julius Barnes, detained in Duluth, Minn., because of the death of his mother, the executive committee session was presided over by Lewis E. Pierson, chairman, Irving Trust Co., New York. Others present included:

Myron C. Taylor, chairman of the finance committee, United States Steel Corporation, New York; William Butterworth, president of the National Chamber; Owen D. Young, chairman, General Electric Co., New York; Elbert L. Carpenter, president, Shevlin Carpenter & Clarke Co., Minneapolis; Harry Chandler, publisher, Los Angeles Times, Los Angeles; Charles Cheney, president, Cheney Brothers, South Manchester, Conn.; Stuart W. Cramer, president, Cramerton Mills, Inc., Cramerton, N. C.; Pierre S. duPont, chairman, E. I. duPont de Nemours & Co., Wilmington, Del.; Walter S. Gifford, president, American Telephone & Telegraph Co., New York; Cornelius F. Kelley, president, Anaconda Copper Mining Co., New York; Thomas W. Lamont, J. P. Morgan & Co., New York; John G. Longfale, president, Mercantile-Commerce Bank & Trust Co., St. Louis; George Horace Lorimer, editor, *Saturday Evening Post*, Philadelphia; Paul Shoup, president, Southern Pacific Co., San Francisco; Walter C. Teagle, president, Standard Oil Co. of New Jersey, New York, and David Whitcomb, president, Arcade Building & Realty Co., Seattle.

Government Construction Program

Secretary of Commerce R. P. Lamont was present at both the construction conference and the executive committee meeting, and presented a favorable report on the status of the Government construction program. The construction conference marked the first time that such groups of competing units have come together entirely of their own volition to discuss cooperative action in the interest of the general welfare, and was held to be strongly reminiscent of the united war-time effort put forth at the request of the Government.

Steel, brick, tile, lumber and various other lines were represented at the conference which, in addition to arranging for the advertising fund, recommended the creation of a permanent research group for keeping in touch with the building needs of the country. This group would cooperate with Governmental and other research groups and would particularly keep in mind the dangers and disadvantages of over-building in given communities where existing construction meets or is likely to meet requirements of the near future.

Another major measure favored was the creation of a special home financing committee, whose function it would be to encourage actively and systematically the making available of funds for building and for remodeling or modernizing. This also has in mind the bringing back into normal channels of expenditure funds that had been diverted to speculation and similar uses.

Secretary Lamont called attention to the vast amount of public and semi-public construction work scheduled for the coming year. He made the point that, while the \$7,000,000,000 or more scheduled for expendi-

ture during 1930 represented only a slight increase over expenditures in the past, the fact that it represented an increase rather than a decrease was a good augury of continued satisfactory business conditions.

Among those attending the conference were:

American Iron and Steel Institute—James B. Bonner, Washington; American Institute of Steel Construction—K. H. Gayle, district manager, Ingalls Iron Works Co., New York; V. G. Iden, New York, and W. M. Wood, president, Mississippi Valley Structural Steel Co., Decatur, Ill.; American Railway Association—J. H. Parmelee, director, Bureau of Railway Economics, Washington; American Supply and Machinery Manufacturers Association—R. Kennedy Hanson, secretary, National Pipe and Supplies Association, Pittsburgh; Associated Metal Lath Manufacturers—Charles M. Lund, Boylston, Mass., E. M. Lurie, Chicago; Hardware Manufacturers' Institute—M. W. Stark, Columbus, Ohio; Hollow Metal Door and Trim Manufacturers' Association—C. F. Burt, New York; National Association of Flat Rolled Steel Manufacturers—A. N. Flora, vice-president and secretary, Cleveland; National Association of Sheet Metal Contractors of the United States—W. C. Markel, secretary, Pittsburgh; John A. Pierpoint, Washington; National Retail Hardware Association—W. N. Neff, Abington, Va.; Sanitary Brass Manufacturing Association—R. Kennedy Hanson, secretary, Pittsburgh.

Austin Co. Enters Field of Structural Welding

The Austin Co. will add an electric welding department to its Cleveland fabricating plant and hereafter will do electric welding as a regular part of its service, making welding or riveting optional with the owner of the building that is being erected. The company's plans provide for a 50 per cent increase in the facilities of its fabricating plant to permit the installation of electric welding equipment. Complete field welding equipment will also be provided.

Engineers of the Austin Co. have conducted tests over a period of several years and these have convinced them that welding is destined to have a substantial place in the fabrication of structural steel, according to an announcement by W. J. Austin, president of the company.

Drop in Electric Hoist Orders in December

Members of the Electric Hoist Manufacturers Association report a decline of 4.8 per cent in the number of hoists and a decrease of 6.16 per cent in the value of hoists ordered in December as compared with November. Shipments were 11.6 per cent smaller in December than in the preceding month.

The next meeting of the association, which will be the annual convention, will be held on March 20 at Pittsburgh.

Ready for the Distribution Census

Schedules Completed and First Group of Supervisors at Work—Why Cooperation of Manufacturers Is Expected

WASHINGTON, Jan. 28.—Ore mining, the blast furnace, the steel works, the rolling mill, the metal-working industries and the foundry, are on the eve of acquiring specific statistical needs such as never before have been possible. This information will be made readily available to them, as it will to all other lines of business, wholesale and retail, through their full cooperation with the Bureau of Census. The Bureau has just completed preparation of schedules for the nationwide gathering of data in connection with the 1930 decennial census.

A particularly notable feature is that the canvass will deal for the first time with the extremely important subject of distribution. It is proposed not only to gather the data, but to make them public from time to time as soon as available, in order that they will be of a current character, and therefore of increased value. Like all censuses, the present one carefully protects the sources of information, as required by law, and the material to be published will be presented in such form that individual operations are not disclosed.

Work of gathering information has been started, but will not become general until some time in February. It has been divided into two major divisions. First, that confined to cities exceeding 10,000 in population, to be done by a specially organized force; second, that covering rural sections and towns of less than 10,000 population, to be done by the usual population and agriculture enumerators. There will be between 4000 and 5000 workers in the first specially organized group. As many as necessary of the 60,000 in population work in the rural and other groups will be used for the manufacture and distribution census. In all, the population enumerators will total about 125,000.

In the business census, cities of more than 10,000 population will be divided into about 80 working districts, each of which will be in charge of a special experienced supervisor detached from the Washington office of the Bureau of Census.

Industry Prepared the Schedules

That the information to be gathered from the iron and steel, metal-working and other industries (as well as that to be obtained from wholesale and retail lines) will be of practical value is denoted by the fact that the advisory committees set up consist of 26 business and professional men and officials, who have assisted in preparing the schedules. The advisory committee on manufactures is headed by Col. L. S. Horner, president, Niles-Bement-Pond Co. This schedule has been drafted with one basic thought in mind, the tabulation of material of real practical value, directly or indirectly, to manufacturers in their studies of production and distribution

problems. Especially has emphasis been laid on the distribution feature of the studies, for it is realized generally that distribution outranks all other problems in connection with the question of merchandising.

The steel industry has, with other industries, taken this position, and notable men in the industry, such as President E. G. Grace, of the Bethlehem Steel Corporation, for some time have been sounding the importance to steel producers of improving their position as merchants.

What the Schedules Will Show

The census schedules have been drafted with the idea in mind of showing definitely not only production, but also sales, channels and areas of distribution, proportion of business done on credit, inventory, expenses, number of employees, wages and various other items. In wholesale and retail trade there will be detailed information of this and other kinds gathered, excepting necessarily that of production.

Information will be sought as to the number of establishments operated by a given concern where there is more than one, their location, character of organization, whether individual, partnership or incorporated, etc. Sales by commodities will be tabulated.

Special efforts will be made to tabulate the data in such a way as to point out the most significant industrial trends. Among such is that of migration, a movement that in some cases has entirely changed the industrial occupation of large numbers. For the first time also the census will make available data on the amount of idle power equipment in manufacturing plants. Estimates have been made that as much as 50 per cent of the installed power in the United States is idle through obsolescence, over-capacity, or other causes. But there are no definite data on the subject.

In addition to Colonel Horner the Advisory Committee includes, among others, George G. Crawford, Tennessee Coal, Iron & Railroad Co., Birmingham; Walter S. Tower, Bethlehem Steel Co., Bethlehem, Pa.; Clarence M. Woolley, American Radiator Co., New York; Charles F. Abbott, American Institute of Steel Construction, Inc., New York; J. E. Edgerton, president, National Association of Manufacturers, New York, and John F. Daly, Bureau of Census, Washington.

Data will be collected showing to what extent manufacturers sell through wholesalers, direct to other manufacturers, retailers, direct to home consumers, etc., providing a comprehensive picture of all phases of distribution. No attempt will be made to obtain information concerning the profits of reporting sources.

The study is even omitting all questions which would show the gross margin between purchases and sales. The value of the sales will be ascertained, but the cost of the goods purchased will not be sought.

The taking of the census also will require the interviewing of approximately 2,000,000 wholesalers, retailers and others, who, on the average, will be asked more than 200 questions each.

It is the earnest desire of those having charge of the work that generous cooperation will be forthcoming from the business and other interests of the country. While the law requires that the questions be answered, the desire is that the cooperation will be entirely voluntary with the realization on the part of those furnishing information that they will be the ones most greatly benefited.

Says Buying Out of Future Income Caused Depression

The current business depression and recent smash in the stock market were largely due to the fact that we taught the man on the street to buy something he had no right to purchase, and then helped him to finance that purchase, according to E. B. Gallaher, Clover Business Service, Norwalk, Conn., who was a guest of the New England Iron and Hardware Association at its thirty-seventh annual banquet in Boston last week.

People, he said, mortgaged their prospective earnings for months in advance, very largely in purchases of houses and automobiles. In Mr. Gallaher's opinion, business will continue to decline until mid-year, and then for one, two or possibly three months execute a sideways movement. Toward fall, he stated, we should begin to see signs of a change in the trend, but business and profits in 1930 will be considerably less than in 1929. For some time we shall have a serious labor situation to meet, there being more out of employment today than at any previous time during the past 16 years.

Capt. Giuseppe De Lucca, manager, American-Italian Steel Institute, Milan, Italy, also was a guest of the association and urged the American business man to make good, since the prosperity of Italy and of Europe in general depends to a very large extent on the prosperity of the United States.

Hon. Frank G. Allen, governor of Massachusetts, said that Massachusetts and municipalities in that State will spend \$110,000,000 in public improvements this year. He intimated that the State tax this year will be reduced to the smallest figure in 30 years. He believes that business will be back on a normal basis within a very few weeks.

William H. Bowe, Herrick Co., Boston, vice-president of the association, presided at the dinner. Franklin E. Bragg, Bangor, Me., president, was unable to attend owing to illness.

Steel Treaters' Semi-Annual Program Changed

Final plans for the semi-annual meeting of the American Society for Steel Treating, to be held in New York, Feb. 7 and 8, have been completed. Certain changes from the originally announced program have been made. The Friday morning technical session will consist of papers by Charles McKnight, International Nickel Co., and by A. B. Kinzel and W. B. Miller, Union Carbide & Carbon Research Laboratories. Mr. McKnight's paper is "Nickel Alloy Steel Forgings." The second paper is "Data on Manganese Structural Steels with Chromium Additions."

Friday afternoon's session will consist of three papers, "A Study of the Grain Structure of Martensite," by E. C. Bain and K. Heindlhofer, U. S. Steel Corporation Research Laboratories. W. J. Merten, Westinghouse Electric & Manufacturing Co., will read a paper on "The Annealing or Softening of Nitrided Steels by Chemical Decomposition of the Nitrides." "The Transformation and Constitution of High Chromium Steels," a paper by Takejiro Murakami, Kojin Oka and Seiji Nishigari, Tohoku Imperial University, Sendai, Japan, will be presented by Jerome Strauss of the Vanadium Corporation of America.

On Saturday, Edward S. Lawrence, Duraloy Co., will speak on "Recent Developments in Normalizing Sheet Steel." A paper, "Some Notes on Sheet Metal and Strip Steel for Automobile Bodies," by Joseph Winlock and George L. Kelley, Edward G. Budd Manufacturing Co., will follow. George M. Eaton, Molybdenum Corporation of America, will close the sessions with a paper dealing with the "Methods of Presenting Data on Nitrided Steel."

Bethlehem Steel Organizes Pacific Coast Unit

The Bethlehem Steel Corporation has announced that the properties and business of the Pacific Coast Steel Co. and the Southern California Iron & Steel Co., which it recently acquired, will be operated as the Pacific Coast Steel Corporation. The Pacific Coast Steel Corporation has taken over the entire selling organization of the Bethlehem company on the Pacific Coast and, in addition to selling the products of the Pacific Coast plants, it will sell the full line of products manufactured at the plants of the Bethlehem company in the East.

The executive and sales departments of the Pacific Coast subsidiary will have their headquarters in the Matson Building, San Francisco, with sales offices also in Los Angeles, Portland and Seattle. The treasury, purchasing and other departments will have their headquarters at Twentieth and Illinois Streets, San Francisco.

Officers of the Pacific Coast Steel Corporation have been named as fol-

lows: president, D. E. McLaughlin; vice-president in charge of operations, T. S. Clingan; vice-president in charge of sales, Arnold Foster; vice-president and treasurer, E. B. Hill.

Structural Industry's Trade Practice Rules Accepted

WASHINGTON, Jan. 28.—With some slight modifications, the Federal Trade Commission has formally accepted rules of trade practice adopted by the steel fabricating industry at a conference held at Biloxi, Miss., on Nov. 11, 1929, at which Commissioner William E. Humphrey presided, assisted by George McCorkle, assistant trade practice director of the commission. On the basis of tonnage, it was estimated that about 70 per cent of the entire industry was represented at the conference. The rules adopted were published in THE IRON AGE of Nov. 21, page 1378.

The commission directed that the resolutions dealing with committees of the industry be placed in two appendices to the rules, and made minor changes in some of the other rules. One of the appendices (A) provides for the appointment of a committee of five to draft and present to the industry standard proposal and contract forms at as early a date as practicable after the rules become effective. Appendix B provides for creation of a committee to investigate whether the rules are being observed and empowers the American Institute of Steel Construction, Inc., to appoint such committee.

Under Group I the commission accepted eight rules, which relate to violation of law, and under Group II, seven rules as expressions of the trade. Rule 1 declares it an unfair trade practice to substitute materials inferior to those specified for a structure. The remaining seven rules under Group I cover such practices as use of methods of manufacture and erection not in accord with the law, selling material below cost, dumping, secret payments of commission, defamation of a competitor, submission of a bid after a contract is awarded and discrimination in price.

Under Group II the first rule provides for condemnation by the industry of any person, firm or corporation aiding or abetting another engaged in unfair trade practices. Another rule is to the effect that to recognize uneconomic or unsafe structural designs is condemned by the industry. Other rules of this class pertain to regulations as to manufacture and erection, lump sum bidding, reopened bidding, and price differentials on less-than-carload lots. Another rule places the stamp of disapproval on misleading promises of delivery and performance that cannot be reasonably fulfilled and misleading statements as to ability to perform the work. To submit a bid without having been requested or invited to do so is condemned as subverting a custom prevailing in the trade.

Smaller River Movement of Steel at Pittsburgh

River commerce in iron and steel products on the Ohio River, in the Pittsburgh district, during December totaled 77,885 tons, compared with 88,011 tons in the preceding month and 78,213 tons in December, 1928. According to the United States Engineers' office, Pittsburgh, which compiles these figures, traffic in steel products on the Monongahela River amounted to 60,957 tons in December, compared with 83,189 tons in November and 79,595 tons in December, 1928. Allegheny River steel commerce was 400 tons in December, compared with 500 tons in the preceding month.

For the year ended Dec. 31, 1929, steel movement on the Ohio River in the Pittsburgh district amounted to 1,212,912 tons. On the Monongahela River the figure was 1,203,727 tons, while 2507 tons of steel was moved on the Allegheny River.

Cartel Committee Considers Sales Control

WASHINGTON, Jan. 21.—Proposals for the creation of a system of national sales cartels to receive and apportion orders, as well as an international cartel to adjust conditions of surplus or shortage of orders in particular countries, were considered by the executive committee of the International Steel Cartel at Brussels, Jan. 13 and 14, according to a cablegram to the Department of Commerce.

The proposed cartels would control all products now embraced by the International Steel Cartel, except light and medium gage sheets. It was decided to exclude these sheets for the present, as control of sales and production would involve too many small producers, but an agreement among these makers is believed likely. The committee will reconvene in Luxembourg, Jan. 24, to reach a final decision.

Pittsburgh Forgings Co. Buys Greenville Car

The Pittsburgh Forgings Co., Coraopolis, Pa., manufacturer of automotive and railroad forgings, has purchased the entire common stock of the Greenville Steel Car Co., Greenville, Pa., manufacturer of mine cars and other railroad equipment. The acquisition has been approved by directors of both companies, according to a statement of Edwin Hodge, president of the Pittsburgh company. The purchase will be financed by the issuance of 20,000 additional shares of Pittsburgh Forgings Co. common stock, bringing outstanding stock to 220,000 shares. The Pittsburgh company last August was consolidated with the Riverside Forging & Machine Co., Jackson, Mich., maker of automotive castings.

End of Business Recession in Sight

Reaction to Terminate in 30 to 60 Days, Says Professor Bullock—Business Downturn Began in July

INDICATIONS are that business recession will run its course in the next 30 to 60 days, according to Charles J. Bullock, professor of economics, Harvard University, and president of the Harvard Economic Society, who addressed members and subscribers of the society at the Engineering Societies Building, New York, Jan. 23.

Steel output, he believes, has been bumping along on "bottom" and will probably move upward instead of breaking through into the "subcellar." Too much attention, he thinks, can be given to so-called "unfavorable" factors. Referring to an imposing list of "depressed" industries with which a member confronted him at Chicago, he declared that there are always some branches of business in distress and that the list today is not so long as in a number of other Januarys since the war. He recalled the despair early in 1919, following the war, when many Americans were satisfied that Europe was ruined and that this country, in a business sense, would have to "stew in its own juice." He mentioned also the much darker outlook that prevailed at the beginning of 1921.

Expects Peak in Last Quarter

Professor Bullock looks for a spring upturn in business, but concedes that it may not be in the full seasonal volume. He sees indications that the world-wide decline in commodity prices, which began last summer, may be approaching an end, following the easing of money both here and abroad.

He does not look for a booming spring trade that will carry over into the middle of the year, but believes that business will undergo a seasonal summer letdown, as it does in most years. However, he sees no reason why there should not be a pickup in the fall and a last quarter that will prove to be the best three months of the year. Total business volume for 1930 may not be as good as that of 1928, but may equal or exceed that of 1927.

Sees End of Building Slump

The decline in construction activity, in his opinion, may come to an end some time this year, but whether any material increase will set in is still uncertain.

Money has eased and may continue to ease for the next 30 days, but is then likely to grow firmer. Predictions of a "good" bond market must be accepted with reserve. There has not been any great liquidation of the large volume of collateral loans and there is no early prospect of a material reduction in these so-called "frozen" or "slow" accounts. Moreover, the spring bulge in demand for credit will soon be upon us.

Likewise, a brilliant comeback of

the stock market is very unlikely, unless there is a flood of gold imports or the Federal Reserve authorities unwisely ease money artificially.

Notwithstanding these reservations, recent developments have not altered the society's conclusion of last November that the current business recession would not be of major proportions. It was clear at that time that the commercial credit situation was good, since seasonal fall loans all over the country were being repaid. It was also noted that there was no general inventory problem and, finally, that money was easing and promised to ease further. Of course, with slackened trade and reduced purchasing power there always turn out to be inventories after a month or two have elapsed, and we are now hearing of accumulations of copper and other commodities, but there is no such inventory problem as existed in 1920.

Business Turned Down in July

The downturn of business actually came last July, when the society's index of manufactures turned down. The figures for this index, however, were not available until August. The first reliable indicator of business reaction was a reduction in the exports of manufactured commodities in May, but in this case the statistics were not available until July. By the end of August all straws were pointing in one direction and in September it was clear that business was definitely in a downward movement.

With the business recession came the stock market break. It is true, said Professor Bullock, that the generally accepted indices of stock prices declined in September at the same time that trade fell off, but it cannot be said that the stock market did not forecast business recession. The New York Stock Exchange index, based on the prices of all stocks listed, had turned down at the beginning of the year. This fact is prompting more serious study of the construction of stock market indices, which is one of the most difficult of statistical problems. While the speaker evidenced his impatience with statistical "hind-casting," he thought the lesson of 1929 would be helpful.

Stock Exchange Machinery Broke Down

The stock market panic itself was due, to a large extent, to a breakdown of stock exchange machinery, according to Professor Bullock. A great deal of potential buying power could not be brought to bear on the market, and demoralization took place to an extent that cannot be exaggerated. The situation had not looked alarming until Oct. 20, and most people were glad to see that a corrective movement was under way. But the

panic turned what appeared to be an intermediate movement into a major movement in stock prices.

In response to a question from the floor regarding the possibility of a gold shortage, Professor Bullock said that conditions of gold production and consumption indicate that the metallic base for credit may not increase as fast as the needs of trade and that commodity prices in the next 20 or 25 years may swing downward. However, the central banks can expand credit at a more rapid rate, if they wish to do so, although there is a final limit to the amount of credit that can be built up on a given gold basis.

Survey of Scrap Industry Now Under Way

The first survey of the scrap iron industry is now being undertaken by the Institute of Scrap Iron & Steel, Inc. Questionnaires have been sent out by the research bureau of the institute to consumers and producers of scrap, to ascertain the production and consumption of scrap. A special survey of scrap iron dealers and brokers will also be undertaken to ascertain the facts concerning the distribution of scrap.

The new census of distribution, now being conducted by the Government, will also cover the scrap iron industry, its scope, investment, total volume of business, number of people employed, etc. The Census Bureau has agreed to include the scrap iron industry in its census of distribution at the request of the research bureau of the scrap institute.

W. H. Woodin Elected Head of Railway Car Institute

W. H. Woodin of the American Car & Foundry Co. has been elected president of the American Railway Car Institute, 61 Broadway, New York. He succeeds J. M. Hansen, late president of the Standard Steel Car Co. J. F. MacEnulty, vice-president, Pressed Steel Car Co., was elected first vice-president of the institute and C. A. Liddle, president of the Pullman Car & Mfg. Corporation, is second vice-president. W. C. Tabbert, who has been secretary for some years, was appointed also to the position of treasurer, succeeding William Bierman, secretary of the Standard Steel Car Co., who has been treasurer since the organization was founded.

At the annual dinner of the institute, Herbert W. Wolff, vice-president, American Car & Foundry Co., discussed the outlook for railroad equipment purchasing and gave it as his opinion that 1930 will at least equal 1929 in orders for new cars.

American Rolling Mill Co. will remove its Philadelphia office on Feb. 1 from the Franklin Trust Building, Fifteenth and Chestnut Streets, to larger quarters in the Lewis Tower, Fifteenth and Locust Streets.

Steel Corporation Earns Over \$21 a Share

Fourth Quarter Earnings Exceed Those of Corresponding Period of 1928—Regular Dividends

EARNINGS of the United States Steel Corporation in 1929 amounted to about \$21.18 per share of common stock, after payment of the preferred stock dividends. The fourth quarter, on the basis of 8,132,840 shares, showed a contribution of \$4.14. In addition, there became available, as was the case a year ago, a special income described as "receipts for the year, including net adjustments in various accounts not applicable to any particular quarter," and this amounted to over \$1.22 per share. The earnings for the first nine months on a somewhat smaller number of shares were \$15.82, so that apparently the year's earnings exceeded \$21, as stated.

The principal figures of the earnings' statement are given in the accompanying table. Total earnings exceeded those of the corresponding quarter of 1928 by more than \$3,000,000 but were 20 per cent under those of the third quarter. A decidedly smaller deduction had to be made, as was expected, for the interest on corporation bonds outstanding. The result was a balance for dividends nearly one-third greater than that of a year ago.

The indicated surplus for the year, at over \$108,900,000, compares with

Oct. 21, 1929. These earnings compare with earnings of \$4.01 per share on 2,400,000 shares of common stock during the third quarter, and \$2.58 per share on 1,800,000 shares during the fourth quarter of 1928. Total earnings for year 1929 were \$15.50 per share on 2,273,333 shares of common stock, the average number of shares outstanding during the year, as compared with \$6.52 per share on 1,800,000 shares for 1928.

Gross sales and earnings for 1929 aggregated \$342,516,207 compared with \$294,778,287 for 1928. The total amount of new business booked during the year amounted to \$369,536,888 as compared with \$295,209,483 for 1928.

The value of orders on hand Dec. 31, 1929, was \$86,060,883 as compared with \$61,067,997 at the end of the previous quarter, and \$59,040,202 on Dec. 31, 1928.

Operations averaged 76.8 per cent of capacity during the fourth quarter as against 97.8 per cent during the third quarter, and 91.8 per cent for the entire year, as compared with 82 per cent for the previous year. Current operations are at the rate of approximately 74 per cent of capacity.

Cash and liquid securities as of Dec. 31, 1929, amounted to \$196,019,078 (including cash reserved for the retirement of bonds) as compared with \$57,698,774 on Dec. 31, 1928.

The cash expenditures for additions and improvements to properties in 1929 amounted to \$22,193,308. The estimated cost to complete construction authorized and in progress as of Dec. 31, 1929, was \$52,600,000.

Comparison of Earnings

In the accompanying table are given figures for the fourth and third quarters and for the full years 1929 and 1928.

Steel Orders Gaining

President Grace, in an informal talk with press representatives after the directors' meeting last Thursday, at which the regular quarterly dividend of \$1.50 a share on the common was approved, said that steel orders received by the Bethlehem company were showing a daily gain and were in excess of the amount of finished steel being produced. Mr. Grace predicted a gradual stepping up of the company's operations from the 74 per cent rate in effect last week.

The company has received larger orders from the automobile industry, he said, mostly in bars, sheets and wire. He prophesied that 1930 would be a better year for construction activities than 1929. Not much actual business has developed from the programs announced by railroads, public utilities and others at President Hoover's business conferences late last fall, but he expected that results of that conference would come later, as many of the large projects outlined at Washington require more time than has elapsed. He thought there was no question of the pronounced psychological effect of the President's efforts to stabilize business.

Mr. Grace was also hopeful for an unusual amount of shipbuilding business this year.

Fourth quarter earnings of the company were helped out by the fact that the billing prices averaged 82c. a ton higher than in the third quar-

Earnings of United States Steel Corporation

Earnings for Fourth Quarter, 1929

	Total Earnings
Oct., 1929.....	\$22,066,325
Nov., 1929.....	18,367,107
Dec., 1929.....	15,951,902
Total earnings after deducting expenses, taxes and interest	\$56,385,334
Less charges and allowances for depletion, depreciation and obsolescence	15,816,892
Net income	\$40,568,442
Deduct: Interest corporation bonds	596,084
Balance	\$39,972,358
Dividends:	
Preferred, 1 1/4 per cent	\$6,304,919
Common, 2 3/4 per cent	14,541,013
	20,845,933
Surplus for the quarter	\$19,126,425
Surplus for 9 months	79,804,456
Special income not applicable to any particular quarter	9,972,351
Total surplus for year	\$108,903,232

that calculated for the preceding year of \$38,965,000. No announcement was made for any appropriation for improvements or additions to plant and property, and the regular dividends were declared.

Bethlehem Reports Good 1929 Earnings

Profits for Year Equal to \$15.50 a Share on Average Number—President Grace Sees Moderate Upturn

THE Bethlehem Steel Corporation, in its preliminary report for 1929, issued last week, showed net income for the fourth quarter of \$10,046,197, as compared with \$11,384,720 in the third quarter, a better return than had been expected in view of the decline in steel business during the last three months of the year.

Earnings in 1929 were equal to about \$15.50 a share, taking the average number of common shares for the year, there having been two new is-

sues, one of 600,000 and the other of 800,000 shares.

In making public the statement of earnings, President E. G. Grace said:

Earnings during the fourth quarter of 1929, after deducting all charges and dividends on the preferred stock, were equal to \$2.75 per share on 3,013,333 shares of common stock, the average number of shares outstanding during the quarter, and \$2.59 per share on 3,200,000 shares of common stock outstanding at the end of the quarter, an additional 800,000 shares having been issued as of

	Fourth Quarter, 1929	Third Quarter, 1929	Year, 1929	Year, 1928
Total income of the corporation and its subsidiary companies.....	\$16,444,519	\$17,716,173	\$67,469,245	\$43,521,136
Less—Interest charges.....	2,904,419	2,758,544	11,217,180	11,276,879
Balance	\$13,540,100	\$14,951,629	\$56,252,065	\$32,244,257
Deduct—Provision for depletion, depreciation and obsolescence.....	3,493,903	3,566,909	14,009,085	13,658,335
Net income for the period.....	\$10,046,197	\$11,384,720	\$42,242,980	\$18,585,922
Less—Dividends:				
Preferred stock.....	\$1,750,000	\$1,750,000	\$7,000,000	\$6,842,500
Common stock.....	4,800,000	4,800,000	15,600,000	1,800,000
Total	\$6,550,000	\$6,550,000	\$22,600,000	\$8,642,500
Surplus for the period.....	\$3,496,197	\$4,834,720	\$19,612,980	\$9,943,422

ter. Billing prices in this quarter would be considerably lower, he said, and the recent decline in selling prices had been a disturbing factor, but he believed that prices have now reached a point of stability and that the price trend would be upward again as soon as the mills have accumulated sufficient business for better operations.

He thought that 1930 would turn out to be a very good year for the steel industry, though he did not look for volume or profits equal to those of 1929, adding that the steel mills do not require maximum operations for a satisfactory showing.

Acme Steel to Declare Stock Dividend

Annual statement of the Acme Steel Co., Chicago, for the year ended Dec. 31, 1929, reveals net income of \$2,553,214 after all charges including interest and Federal taxes. This is equal to \$9.30 a share on 274,437 shares of capital stock and compares with \$11.93 a share on 182,958 shares for 1928. Stockholders have approved an increase in the authorized capitalization to 500,000 shares of \$25 par capital stock from 300,000 shares, thus paving the way for a payment on Jan. 15 of a stock dividend of 25 per cent.

Outlook "Fair to Good," Steel Founders' Report

More than 35 per cent of the members reporting to the Steel Founders' Society of America found the outlook for business good in December, while 58 per cent considered it to be fair and about 6 per cent regarded it as poor. These data were presented at a meeting of the society held Jan. 27 and 28 at the Hotel Sherman, Chicago.

Seven memberships have been added since the society held its meeting in Pittsburgh on Dec. 12.

Attention was called to the new employment and placement bureau which is now being operated by the society.

It was decided to hold the next meeting on Feb. 27 at Philadelphia.

Methods of handling the pattern problem were discussed by W. J. Donnelly of the George H. Smith Steel Casting Co., Milwaukee. The thought was expressed that too often prices for castings are quoted without full information as to the type, suitability and condition of patterns, with resultant added cost to the foundry, delays in making shipments and sometimes hard feeling between seller and customer. It was suggested that the society make a study of possible standards in such matters as pattern boards. Although the buyer is often at fault in the matter of providing satisfactory pattern equipment, it was charged that the foundry does not always know what it wants. Attention was called to the fact that less than 50 per cent of patterns received at foundries are properly painted, according to established standards.

Republic Merger Terms Announced

Agreement Reached on Exchange of Stock and Other Financial Details of New Steel Company

THE Republic Steel Corporation, which will be a consolidation of the Republic Iron & Steel Co., Central Alloy Steel Corporation, Donner Steel Co. and Bourne-Fuller Co., has announced terms for the exchange of stock and other financial details of the independent steel merger agreed upon several weeks ago.

Holders of common stock of the constituent companies will be entitled to receive new Republic common stock as follows: One share of new common for each share of present Republic stock; four-ninths of a share of new common for each share of Central Alloy common; five-twelfths of a share of new common for each common share of Donner Steel, and ten-thirteenths of new common for one share of Bourne-Fuller common. A trading basis for the preferred stock has also been announced, which includes cash payments as well as preferred stock of the new company.

A block of the preferred stock will be offered for sale within a few weeks by a banking syndicate headed by Otis & Co., Cleveland and New York. The total preferred stock issue will be \$55,000,000 of 6 per cent cumulative convertible shares of \$100 par value. The convertible feature has been worked out on a sliding scale basis, whereby the preferred can be

exchanged for the common. There will be 1,985,144 shares of common stock.

The Trumbull-Cliffs Furnace Co. becomes a part of the new company by an exchange of its stock for that of the present Republic common stock. Other subsidiaries are the Steel & Tubes, Inc., and the Union Drawn Steel Co. A new subsidiary to be organized, as previously announced, is the Republic Research Co., which will devote itself to the research and metallurgical work of the company.

Total assets are listed at \$335,696,814. The funded debt of the new company will aggregate \$59,059,400.

The plan of consolidation was formulated by and is to be carried out under the direction of a committee consisting of the following: F. J. Griffiths, Central Alloy Steel Corporation, chairman; John A. Topping and E. T. McCleary, Republic Iron & Steel Co.; Philip Wick and William G. Mather, both of Republic Iron & Steel Co. and Central Alloy Steel Corporation; F. H. Hobson and Paul Llewellyn, Central Alloy Steel Corporation; R. S. Hall and L. H. Elliott, Bourne-Fuller Co.; W. R. Burwell and W. P. Witherow, Donner Steel Co.

Deposit of stock is requested by Feb. 17 to make the plan operative.

Underwrites Finances of Standards Association

Announcement that the underwriting of the finances of the American Standards Association for a period of three years, to permit a total annual expenditure of \$150,000 for the association's work, is now being completed, has just been made by William J. Serrill, president of the association. This fund permits an increase in the 1930 budget of \$80,000 over the previous budget and is expected to result in an expansion of national standardization work affecting practically all industries.

The fund is being underwritten by a large group of industrial organizations. The underwriting was arranged by a committee consisting of James A. Farrell, president, United States Steel Corporation; Gerard Swope, president, General Electric Co.; George B. Cortelyou, president, Consolidated Gas Co., New York, and F. A. Merrick, president, Westinghouse Electric & Mfg. Co.

Because of the rapid growth of the industrial standardization movement in this country, the underwriting was planned to permit immediate expansion of the work of providing authoritative national standards, while permanent financing is under way. It is expected that this financing will be completed during the three-year period of the underwriting.

Among the companies joining in the underwriting are: Aluminum Co. of America, American Telephone & Telegraph Co., Bethlehem Steel Co., Consolidated Gas Co. of New York, Detroit Edison Co., General Electric Co., General Motors Corporation, Gulf Oil Corporation of Pennsylvania, Public Service Corporation of New Jersey, Standard Oil Co. of New Jersey, United States Steel Corporation, Westinghouse Electric & Mfg. Co., and Youngstown Sheet & Tube Co.

Decide Order of Topics for Machinery Conference

WASHINGTON, Jan. 28.—Topics for discussion at the fifth conference of machinery and equipment associations here on Feb. 3 at the Chamber of Commerce of the United States have been announced in the following order by Chairman E. F. DuBrul:

Controlling the "Trade-In" Evil, Uniform Cost Accounting, Establishment of Normal Depreciation Rates, Time Sales, Industry Statistics, Promotion of Standards, Market Research, Stabilization of Employment and Production, Association Activities, Cross-Licensing of Patents. Other subjects suggested by representatives of the associations, and which will be discussed provided there is time, include Firm Bidding, Free Trials and Thirteen-Month Calendar.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

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An Anomalous Building Situation

DEMAND for residential buildings is of proportions not generally apprehended. As opening the way to business expansion it is a key item of prime importance. To satisfy this demand special efforts, it appears, must be taken to provide mortgage money.

As investigation shows that for months building and loan associations, which support a very large percentage of building operations, have been unable to grant loans. Throughout the period of the stock market boom, money did not flow into such associations at a rate making for expansion. Similarly, mortgage departments of banks proved unequal to requests to finance building work. The records one day will show to what extent drafts from savings accounts and loans against life insurance have helped to finance stock speculation. No longer is there this untoward influence, and the pressure for building ought to get relief.

The fact is very reassuring. It is not especially surprising, seeing that residential construction last year was 26 per cent under the average of the last five years. It is reassuring in that it comes on top of an admitted expansion in the type of construction best described as civil engineering. In an article in the issue of Jan. 9 it was pointed out that total building construction should reach \$69 per capita this year against \$63.84 last year. Of this about \$56 would be for general buildings, compared with \$52.08 in 1929, a figure below any of the preceding four years. This estimate seems now conservative in the light since gained with respect to the broad insistence of the residential building demand.

The real point of all this is that there is a call for help from all quarters. Building and loan associations will not overnight attract a flood of deposits. The frozen loans of banks—one of the aftermaths of the stock market collapse—are in the nature of the case slow in liquidation. About the only entities apparently possessing free money in quantity are the large industrial companies, which were such free lenders to stock market borrowers. Perhaps the obligation is for them to invest as may be in highly negotiable paper such as they can properly take. The borrowing for the civil engineering enterprises will of itself be large.

The unusual must apparently be done, to bring about an approach to an equilibrium among all forces affecting industrial activity, and this means more or less new, and doubtless temporary, ways.

We have the anomalous situation of a demand which everyone wishes to satisfy but finds it difficult

to do. Ordinarily the problem of industrial expansion is to develop desire. Here instead is a conspicuous case of large demand, everyone keen to meet it, and money the big need, more or less available but not easily diverted for the purpose. Will not publicity respecting the situation bring a solution?

Not Aiming to Build Pyramids

IT is natural that we can see things backward better than forward. Thus we can now see that the recession in American business has been sharper than three or four months ago was anticipated. The statistics of labor employment are probably the best generalized index of this. We can also see more clearly that the check occurred in those branches of production wherein output was temporarily overdone. Possibly the catastrophe in the stock market was of little effect except sentimentally.

We doubt if there has been any contraction in real consumption. This is to say, for example, that the people have been using their automobiles and replacing them right along, but the automobile manufacturers temporarily outstripped the requirements and naturally had to halt, which curtailed the demand for steel, copper, etc. It is a well established fact, however, that a general overstocking of goods is quickly absorbed, and many economic observers now discern signs of improvement and are optimistic in respect to spring business.

There are, however, those whose statements are ominous, and who may be misunderstood. Thus Prof. Irving Fisher, who predicts a sinking of commodity prices and the coming of hard times owing to slackening production of gold, to which Prof. Wesley Mitchell substantially assents. These opinions are of course a reflection of the old quantity theory of money, which was never generally accepted among economists. That commodity prices and gold production, or supply, are natural reciprocals is no longer orthodox economic doctrine. It has been too destructively examined by the critical analysis of Dr. B. M. Anderson and others. Consequently the warnings of the fundamentalist professors need not be taken too seriously.

Gold supply plays a part in economic affairs, but there are many other factors. Thus, Prof. Gustav Cassel, who is also a quantitativist, says the present position in the United States is undoubtedly one of great scarcity of capital, caused by the fact that current new savings were not sufficient to maintain production of real capital in the enormous proportions at which it was used last year.

"This being the case," he says, "isn't it foolish to

undertake large new Governmental enterprises in the belief that they can be paid for with available capital? Any effort in this direction, especially if made by the Government, is bound to prove a waste of already scarce reserves, thus weakening the entire political economy. The whole world, therefore, must view with grave concern this Government intervention which, on account of uneconomic investments, is bound to render impossible the accumulation of American savings."

This was in criticism of President Hoover's plan for maintaining activity, and the Washington conferences upon that subject. If we understand it correctly, President Hoover's plan is to continue to create capital by keeping labor employed, which certainly does not happen if a considerable percentage of the workers be idle. If President Hoover contemplated the building of pyramids, or other monuments, Professor Cassel would have ground for concern, but he would surely agree that the direction of labor into doing useful things is a subject of major importance not only in America, but also in Europe.

Basic Principles of Prosperity

THERE is no reason why a country cannot be continuously prosperous. All causes which prevent or interrupt prosperity are exceptions. The exceptions have been so numerous that vision of this fundamental principle has been blurred almost to extinction. Although economists have attempted to generalize, sometimes quite plausibly, the exceptions have really been varied in character, and the very variety of the adverse influences has fostered the common notion that something or other is sure to go wrong.

This is a time to get down to first principles. We have been spending too much time trying to explain prosperity, frequently by parading a list of symptoms or exhibitions of activity and prosperity, when it would be much more enterprising to study the causes of adversity. The indisposition is a bad side of human nature, frequently exhibited by the individual in considering his physical condition, reluctant to study causes of divergence from normal health, the excuse being that he might become a hypochondriac.

The basic principle being that the people should be prosperous, one seeks now to discover causes why there should not be prosperity now or in the immediate future. Adverse natural causes may be instantly dismissed. We have not had poor crops and we have not been seriously injured by earthquake, storms or other so-called visitations of nature.

What was recognized more than two years ago as a danger, and was afterward given a precise name, technological unemployment, has been largely lived down, for the influence has not proved cumulative. It has not been entirely lived down, and warfare must still be waged against it by the development of new commodities and forms of service, to create additional channels of employment.

The adverse influence of the collapse in the stock market, now three months away in our history, proves less injurious than was feared immediately afterward. Favorable influences have come to be well recognized—release of funds for commercial use at fair interest rates, the disposition of men to work

harder at their regular tasks and a more wholesome attitude in general.

Appraisal is now common that, if we are suffering from anything the stock market did, it is from the unreasonable advance which occurred previously. Did the stock market cause trade to be too active, in such manner that a period on the other side was necessary to equalize? Prior to 1928 we had had a period of five years of activity and prosperity, with only slight dips. At that time it appeared, and it still appears, that this was activity and prosperity of a character which could perpetuate itself. Then came a period of unusual activity. What are we to make of that?

There is no reason to suppose that the earlier activity was not healthy and self-perpetuating. After the dip and recovery of late 1927 and early 1928 came the bulge which some are disposed to regard as fostered by the stock market. As such it may be considered unhealthy and not self-perpetuating, but in part, at least, we may regard it as reaction from the previous mild depression.

If this was only partly excessive, as the lack of large inventories in most lines would seem to indicate, we did not have over-much to liquidate when the stock market crash came. Even less, now, remains to be equalized, before we can return to what should be considered the normal condition of activity, stability and prosperity.

Finished Steel Predominates in Exports

EXPORTS of rolled and finished steel last year aggregated 2,082,699 tons, or almost 70 per cent of the total outgoing movement of all iron and steel tonnage products. The gain over 1928 was more than 7 per cent and the total of the rolled and finished exports was greater than the total of all iron and steel annual exports in 1922 to 1925, inclusive. Several of the products made the highest totals in years and tin plate the highest in our history.

Particularizing: Steel bars showed the heaviest outgoing movement since 1920. Steel plates, larger tonnages than in any year since 1921, when the post-war boom in shipbuilding was subsiding. Galvanized sheets, greater quantities than in either of the two preceding years, but smaller than in 1926 or 1925. Black steel sheets, smaller exports than in 1928, but compared with a series of earlier years, about average.

Tin plate, as noted above, made a new high record in exports, at 258,965 tons. The outgoing movement has been particularly uniform over the past four years, as the difference between the highest and the lowest annual quantity for those years is less than 10,000 tons. This commodity has shown a practically uninterrupted growth in export markets since 1922, when less than one-third as much was shipped as in 1929.

Structural material, both plain and fabricated, showed the highest totals since 1920, when shipbuilding was so active. As with tin plate, there has been a practically uninterrupted rise in shipments of structural steel since 1922, in which both classes have participated.

On the other side of the showing, we have exports of rails in 1929 at the lowest point since before the

World War. The tonnage was less than one-half that of 1921 and only one-quarter that of 1920. There appears to be a fairly steadily declining movement in exports of rails, offsetting in some measure the increases recorded in other products.

Despite the huge shipments of scrap in the last few years, the proportion of rolled and finished steel to the total has been going up.

CORRESPONDENCE

For the New Duties on Graphite

To the Editor: In THE IRON AGE for Dec. 26, 1929, page 1739, there appeared an article by a representative of the importers, grinders and crucible manufacturers of graphite, taking the Senate to task for the new duties proposed for imports of graphite. While the group mentioned above can see no excuse for these new duties, the writer can see in them the only hope for the domestic producers of graphite.

Naturally the importers and manufacturers of graphite products would like the raw material to be placed on the free list, but little is heard from them about placing manufactured products on the same list. There is no question that they are amply protected on that score and it appears that Senator Black and the majority of the Senate favor a small measure of protection for the domestic producers. The protest is sponsored by the crucible industry, which consumes a very small part of the world production of graphite. The thorns in the side of the crucible industry have little connection with the price of graphite.

Recently the writer summarized the situation in Alabama as follows:*

Few industries have been characterized by the ups and downs of the graphite industry, and none is more essential to our country in time of war. Graphite has a variety of uses, for which there is no satisfactory substitute. For many years, graphite (plumbago or black lead) was shipped into this country from rich deposits of crystalline lump in Ceylon. This material was particularly successful in the manufacture of crucibles. Prior to that time, crystalline flake from Bavaria was used in crucibles, and pencils were made from crystalline flake. Now, amorphous graphite is considered superior for pencil manufacture. In a like manner, other uses of graphite

*Summary Report on Graphite in Alabama, Circular 9, Geological Survey of Alabama, pages 7-8, 1929.

+Mining and preparing domestic graphite for crucible use, by George D. Dab and Frederick G. Moses. Bulletin 112, United States Bureau of Mines, 1920.

find specific varieties in favor, but it is likely that most any substitution would be possible without detrimental results.

Some years ago, Ceylon lump and chip was considered absolutely essential in the manufacture of crucible, while at the present time Madagascar flake has largely displaced the Ceylon product. Some domestic flakes was used in crucible during the World War, and extensive tests resulted in the assertion that with rare exceptions, a satisfactory crucible stock can be produced from all of the concentrates that are at present made from the Alabama ores. . . . It is thought that the domestic production can very readily be adapted to specific industrial uses, with fair competition from imports. . . .

The small tariff on imports of graphite imposed by Congress in 1922 has brought about a marked rejuvenescence in the industry, with three plants reporting production, and two or three companies planning reopening plants in the near future. . . .

That the 1922 tariff was inadequate was forcibly shown on Dec. 27, only one day after the publication of the protest, by the failure of the largest domestic producer. Incidentally the article in question made quite a point of the fact that this company was asking no increase in the present tariff. As a matter of fact, an analysis of the imports, particularly those from Ceylon, on which the protest is based, shows that this item was largely responsible for the failure of this company. In November, 1929, the average value of imports of Ceylon graphite was 3.68c. a pound, which brings it into direct competition with domestic graphite at 4.32c. a pound, after adding 20 per cent ad valorem tariff. The domestic producers, both past and present, can testify to the utter lack of justice in such competition. Even after adding 2c. a pound, the price would be very close to the producing cost of domestic graphite.

There is no doubt but that all of the Ceylon grades are strictly competitive with the domestic products, and the movement to subject the imports from Ceylon to the same tariff as imposed on imports of crystalline flakes is a laudable one.

Most of the Alabama plants were built for the purpose of supplying graphite to the grinders, importers and manufacturers, who were unable to obtain their usual foreign material because of the French and English boycotts. Perhaps the Senators have this in mind, and are determined to preserve the domestic source of supply. Graphite is a very necessary war mineral and should be of sufficient importance in peace time to be given careful consideration by those who have jurisdiction over these matters.

There is no reason to conserve the domestic supply, for, in spite of what is said to the contrary, there is an enormous supply of satisfactory ore.

WALTER B. JONES,

University, Ala.

State Geologist of Alabama.

Letter published with permission of Geological Survey of Alabama.

Will Show Progress in Iron and Steel

Chicago World's Fair in 1933 to Cover Developments of a Century

A MODERN blast furnace plant operating in model, complete with ore boat, bridges, an ore yard and trestle, will be one of the features of the science exhibit at the Chicago World's Fair, if suggestions adopted by the National Research Council's science advisory subcommittee on iron and steel are approved.

Another model which will indicate the applications of science to the development of the iron and steel industry will be a large open pit mine with models in motion, showing the

old methods of loading boats with wheelbarrows as compared to the present stage of development, with loading docks, and the lifting and dumping of freight cars bodily. Present methods of ore washing will be compared with those in vogue 100 years ago.

The iron and steel subcommittee, which is under the chairmanship of W. H. Eisenman, secretary of the American Society for Steel Treating, has also made further recommendations to the science advisory commit-

tee, embodying depiction of the chemistry and physics of steel treatment, the open-hearth and Bessemer process, metallography and heat treatment, mills, foundry practice and electric steel.

The primitive type of foundry will be the first of a series of models illustrating progress in steel casting. Progress in the working of steel will be shown in a series of exhibits beginning with the old style hammers used in 1833, followed by an authentic reproduction of the first rolling mill. The exhibit will be brought up to date with a comparison between the steam-driven and the most modern electric-driven steel mill.

Discovery and use of the non-ferrous metals will be the basis of a separate exhibit. The progress in alu-

minum, which in 1833 was a scientific curiosity with no commercial value, will be traced, as will the story of tungsten, which was not believed to have any commercial use. Nickel, which had practically no commercial use in 1833, has become one of the major non-ferrous metals. Its history will be told in the exhibit.

Members of the subcommittee on iron and steel include, in addition to Mr. Eisenman, C. B. Murray, H. M. Boylston, H. A. Schwartz, Dr. Zay Jeffries and George B. Garrett, all of Cleveland; Dr. C. H. Herty, of Pittsburgh; W. B. Coleman, of Philadelphia; and W. G. Hildorf, of Canton, Ohio.

The committee is one of 40 subcommittees cooperating with the National Research Council science advisory committee, which is formulating a pattern for the Chicago fair based on the progress of pure and applied science during the last century. Dr. Frank B. Jewett, vice-president of the American Telephone & Telegraph Co., is chairman of the science advisory committee.

Says Consumer Demand May Be Underestimated

Developments during December and the first half of January indicate a slowing up of the decline in business activity, and the volume of sales to consumers, as indicated by department and chain store turnover, suggest the possibility that manufacturers may be underestimating the consumer demand of the near future, according to the Conference of Statisticians in Industry.

Sharp curtailment of automobile production indicates that a balance between supply of new cars and demand is being approached. While new registrations of passenger cars during November for the first time in 1929 fell below those of the corresponding month of previous years, new registrations of trucks continued to surpass those in the corresponding months of all previous years. Foreign sales of automobiles were 32 per cent less than in November, 1928.

New building construction plans contemplated in December indicated a 20 per cent increase over November, and a 19 per cent increase over December, 1928.

Employment, in the metal trades as reported by the National Metal Trades Association, collecting data from 26 cities, showed a 2.9 per cent decrease from November to December, but less than a 1 per cent decline from December a year ago. In five of the 26 cities increases occurred.

McKee-Oliver, Inc., Pittsburgh, district representative for the Buckeye Rolling Mill Co., the Franklin Steel Works, the Cumberland Steel Co., the Lukens Steel Co. and the Moltrup Steel Products Co., has moved to a new warehouse and office at 1326 West Carson Street, Pittsburgh. The company maintains a full line of warehouse steel products.

The Week in Business

Drift of Current Financial and Economic Opinion

"**P**ERHAPS the most noteworthy development just now is that favorable features appear to be becoming dominant, rather than unfavorable ones," says the conservative *Commercial and Financial Chronicle* in commenting on the state of business.

It finds that the steel trade and the automobile trade are giving many signs of reviving activity, although "the start is from a low level, and, accordingly, the recovery might proceed a great deal further and still leave the volume of business at a small figure."

"But the point of importance," in the *Chronicle's* view, "is that the country is getting started on the upgrade again, warranting the deduction that the worst is behind us."

The Harvard Economic Society also believes that the severest phase of the recession is over, although "it is clear that the process of readjustment in manufacturing industries is not yet completed."

The Society's index of volume of manufacture for December dropped to 90 (preliminary figure), the lowest level since July, 1924. Yet the decline last month was not nearly so sharp as in November, when the index fell 11 points to 94.

The readjustment of manufacturing activity, together with reduced money rates here and abroad and recent strength in prices of hides, tallow, lard, cottonseed oil and zinc, suggests the approach of more stable commodity prices, the Society declares. The *Annalist* index of commodity prices has advanced 0.3 point, as a result of moderate increases by food products and farm products.

Reduction of Bank Loans Needed

Reduced money rates cannot be counted on to stimulate a sharp recovery of business, in the opinion of the Alexander Hamilton Institute. "The excess of goods produced in 1929 has not yet been sufficiently absorbed to make it profitable for manufacturers to borrow funds at this time for business expansion."

The Institute points out that interest rates are not far above the

level at the beginning of 1928 when the expansion period of the current cycle started, but states that a further reduction will have to be made in bank loans before credit is in a sufficiently strong position to start business on the expansion period of the next cycle.

"Total loans of reporting member banks still amount to \$17,059,000,000 as against \$15,509,000,000 at the beginning of 1928. . . . This increase would not be significant if reserves deposited in the Federal Reserve banks by member banks had shown a corresponding increase. Instead of increasing, they have decreased. Member bank balances in the Federal Reserve banks now total \$2,367,000,000 as against \$2,486,000,000 at the beginning of 1928."

Farmer Income Lower, Building Outlook Good

Reliance on increased farmer buying power at the present juncture is not justified in the Institute's view. While the Government's December report on the total value of crops showed an increase of 1 per cent over 1928, this will be more than offset, it is believed, by reduced income from livestock and livestock products.

The construction outlook, however, is regarded as good. The *Financial Chronicle* finds that the building trades have made considerable progress on the way back to normal conditions. Permits issued and plans filed in 354 cities have shown a steady decline in the past four years, the total for 1929 having been 30 per cent lower than that of 1925.

Stocks of Manufactured Goods Low

Low stocks of manufactured goods constitute one of the most favorable business factors, according to the National Industrial Conference Board. Commodity stocks in general reached the low point of 1929 in July, after which there was an increase until November, the high point of the year. The gain, however, was chiefly in raw materials and not in manufactured goods. The latter (automobiles excepted) were lower in November than in the first month of 1929.

Iron and Steel Markets

Steel Output at 75 Per Cent

Production Makes Another Impressive Gain—Bookings from Automobile Industry Rise Sharply—Steel Bars and Fender Stock Decline

THE rapid recovery of the steel industry has been a surprise to consumers and producers alike. Still skeptical of the duration of the current rate of activity, a number of the larger mills have hesitated to increase their operations as fast as business seemed to warrant. Yet bookings have continued to grow and, with most buyers pressing for prompt delivery, further expansion in production has been unavoidable.

At Chicago the upturn in demand has been so rapid that mill deliveries have not kept pace with the requirements of buyers. As a consequence, steel ingot output has been raised to 80 per cent, compared with 72 per cent last week, and two blast furnaces have been lighted at Gary, foreshadowing a further rise in open-hearth production.

Producers making automotive steels have experienced the sharpest gain in bookings. One large independent making light rolled products has received specifications in the past fortnight at the rate of 140 per cent of capacity and is now operating its plants at 100 per cent. The tonnage entered last week by another leading independent, with a more diversified output, was nearly equal to capacity, and its production this week has been raised to 80 per cent.

The Steel Corporation rate has risen to 75 per cent and the average for all producers is fully that high. A year ago the operations of the industry ranged from 85 to 90 per cent.

Demand for pig iron is also growing, notwithstanding the extreme caution of buyers. Deliveries to automotive foundries in Michigan are 90 per cent of those in January, 1929. Shipments to all classes of melters by Chicago furnaces have run 30 per cent higher than in December. Pressure for basic iron by non-integrated steel companies in the Valleys has reached the point where the blowing in of a merchant furnace is being considered.

Price weakness has not disappeared, but reductions are in diminishing number, suggesting that stability may be approaching. Mills are unwilling to take second quarter contracts at present figures and, as their bookings increase, speak more confidently of the possibility of advancing the market.

Steel bars, after resisting price pressure longer than the other heavy rolled products, have finally given ground and are now quotable at 1.85c., Pittsburgh, a reduction of \$1 a ton. In line with the declines at Pittsburgh, plates, shapes and bars have dropped to 1.95c. at Chicago and 2c., Birmingham. Southern quotations on black and galvanized sheets have also un-

dergone a downward adjustment in sympathy with recessions at Pittsburgh. Fender stock is off \$3 a ton to 4c., Pittsburgh or Cleveland.

Scrap still has no definite trend. Heavy melting steel has declined 25c. at Pittsburgh to \$16.50, but is stronger at Cleveland and unchanged in other markets.

Although most buyers of finished steel and pig iron are limiting purchases to early needs, an exception must be made for the automobile industry, which is ordering further ahead as its production program becomes more definite. The Chevrolet company, for example, has released round tonnages of sheets for delivery from Feb. 15 to March 15. That company has raised its January schedule from 75,000 to 96,000 cars and plans a larger output for February, possibly as many as 110,000 units. The Ford company has already stepped up production to 8000 units a day, and total motor car output in February is expected to show a gain of 20 per cent over this month.

Fabricated steel awards have risen to 53,000 tons, compared with 25,000 tons a week ago, suggesting that the winter lull in structural work may be short-lived. New work that came up for bids totaled 44,000 tons, of which 18,000 tons is for New York subways.

The backlog of railroad equipment builders have been augmented by purchases of 2300 freight cars by the Milwaukee and 120 locomotives by the Van Sweringen roads. Including 11,500 cars on which the latter lines closed bids Monday, 18,000 cars are pending. Fresh inquiries for 10,000 to 15,000 cars are in early prospect.

Pipe lines in prospect include one of several hundred miles that the Sun Oil Co. plans to lay to Pittsburgh and another, from the Texas Panhandle to Chicago, which has been pending since last fall.

Exports of iron and steel in December brought the 1929 total to 3,032,352 gross tons, the largest amount since 1920. The gain over 1928 was mostly in rolled and finished steel, which went up more than 7 per cent to 2,082,699 tons—larger than the total of all exports in 1925, 1924, 1923 or 1922.

Machinery exports in 1929—\$612,735,771—exceeded the previous record, made in 1928, by 24 per cent.

THE IRON AGE composite price of finished steel has declined for the third consecutive week, now standing at 2.305c. a lb. compared with 2.362c. the first week in January. It is now at the lowest level since November, 1927. Pig iron is unchanged at \$18.17 a ton.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Jan. 28	Jan. 21	Dec. 30	Jan. 29
	1930	1930	1929	1929
No. 2 fdy., Philadelphia.....	\$20.76	\$20.76	\$20.76	\$21.26
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.....	17.69	17.69	17.69	20.19
No. 2, Birmingham.....	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*.....	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa.....	19.50	19.50	19.50	19.75
Basic, Valley furnace.....	18.50	18.50	18.50	17.50
Valley Bessemer, del'd Pgh..	20.76	20.76	20.76	20.01
Malleable, Chicago*.....	20.00	20.00	20.00	20.00
Malleable, Valley	19.00	19.00	19.00	18.00
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace....	100.00	100.00	100.00	105.00

Rails, Billets, Etc., Per Gross Ton:

Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh.....	34.00	34.00	34.00	33.00
Sheet bars, Pittsburgh.....	34.00	34.00	34.00	34.00
Slabs, Pittsburgh.....	34.00	34.00	34.00	33.00
Forging billets, Pittsburgh.....	39.00	39.00	39.00	38.00
Wire rods, Pittsburgh.....	40.00	40.00	40.00	42.00
Cents	Cents	Cents	Cents	
Skelp, grvd. steel, P'gh. lb..	1.85	1.85	1.85	1.90

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.85	1.90	1.90	1.90
Bars, Chicago	1.95	2.00	2.00	2.00
Bars, Cleveland	1.85	1.85	1.90	1.90
Bars, New York.....	2.19	2.24	2.24	2.24
Tank plates, Pittsburgh.....	1.80	1.80	1.90	1.90
Tank plates, Chicago.....	1.95	2.00	2.00	2.00
Tank plates, New York.....	2.02 1/2	2.02 1/2	2.17 1/2	2.17 1/2
Structural shapes, Pittsburgh.....	1.80	1.80	1.90	1.90
Structural shapes, Chicago...	1.95	2.00	2.00	2.00
Structural shapes, New York.	2.04 1/2	2.04 1/2	2.09 1/2	2.14 1/2
Cold-finished bars, Pittsburgh.	2.10	2.10	2.30	2.20
Hot-rolled strips, Pittsburgh..	1.80	1.80	1.90	1.80
Cold-rolled strips, Pittsburgh.	2.65	2.65	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Operations Stepped Up to a Range of 70 to 80 Per Cent as Steel Orders Continue to Gain

PITTSBURGH, Jan. 28.—With steel specifications well maintained and the operating rate in Pittsburgh and nearby districts still tending upward, the first month of the year will come to a close with steel makers in an optimistic frame of mind. During the last week a number of the smaller independent companies in this district have put on additional open-hearth furnaces, bringing the operating rates of some of them to 75 or 80 per cent of capacity. Pittsburgh companies are now running at not less than 70 per cent of capacity, with the average in the Valleys and the Wheeling district slightly higher. As compared to the 40 to 50 per cent rate which prevailed in the last week of December, the increase in the last 30 days has been nothing short of record breaking, but the late December output was abnormally low. Further increases in production must be expected to come at a much slower rate than they have during January.

Two large independent companies in this locality report that their January tonnage releases have fallen only slightly behind the average for 1929, but this could not be expected to hold in the case of shipments or new orders. A goodly portion of the steel released this month reached company order books at the beginning of the last quarter. As might also be expected, backlogs have not been built up very much in January and a large proportion of the steel specified dur-

ing the month will have been shipped before Feb. 1. Nevertheless, some of the larger companies have hesitated to step up their operations as rapidly as business seemed to warrant and will enter the new month with the assurance of a fairly steady rate of production, even though business fails to maintain its recent activity. For in all justice to the remarkable comeback which the steel industry has made in January, estimates of the future trend are tinged with caution.

Many large users of steel are still hesitant in placing their orders and, while this may be attributed partly to the weak price situation, the average buyer who suddenly finds himself badly in need of steel probably will not delay purchasing very long on account of price. However, prices are achieving more stability as the month closes, and, with quotations on sheets, strip and other products at lower levels than they have been for a long time, prices might serve as an incentive to buying rather than a deterrent. Steel companies are also anxious to bring the price structure to more profitable levels, and the fact that many of them are unwilling to take contracts at present figures fortifies the belief that advances in the quoted schedules may be expected before many weeks.

The pig iron market continues very dull, but steel companies which buy their basic iron are taking much heavier shipments and foundries in the district are increasing their requirements gradually. The weaker tone in scrap prices, which has appeared in the last week or two, has been translated into slightly lower quotations on the principal grades.

Pig Iron.—Buying of pig iron is still confined to small lots, but the

Finished Steel,	Jan. 28	Jan. 21	Dec. 30	Jan. 29
	1930	1930	1929	1929
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh.....	2.60	2.60	2.75	2.85
Sheets, black, No. 24, Chicago.....	2.75	2.75	2.75	2.95
dist. mill.....	2.30	2.30	2.40	2.65
Sheets, galv., No. 24, P'gh.....	3.30	3.30	3.40	3.60
dist. mill.....	3.40	3.40	3.50	3.70
Sheets, blue, No. 13, P'gh.....	2.25	2.25	2.25	2.20
dist. mill.....	2.35	2.35	2.45	2.30
Wire nails, Pittsburgh.....	2.30	2.30	2.40	2.60
Wire nails, Chicago dist. mill.....	2.35	2.35	2.45	2.70
Plain wire, Pittsburgh.....	2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill.....	2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh.....	2.95	2.95	3.05	3.30
dist. mill.....	3.00	3.00	3.10	3.35
Tin plate, 100 lb. box, P'gh.....	\$5.25	\$5.25	\$5.35	\$5.35

Old Material, Per Gross Ton:

Heavy melting steel, P'gh.....	\$16.50	\$16.75	\$15.75	\$19.25
Heavy melting steel, Phila.....	14.50	14.50	14.50	17.50
Heavy melting steel, Ch'go.....	12.75	12.75	12.50	16.00
Carwheels, Chicago.....	14.00	13.75	13.75	14.50
Carwheels, Philadelphia.....	15.00	15.00	15.00	16.50
No. 1 cast, Pittsburgh.....	14.50	14.50	14.50	16.00
No. 1 cast, Philadelphia.....	15.00	15.00	15.00	16.50
No. 1 cast, Ch'go (net ton).....	13.50	13.50	13.50	16.00
No. 1 RR, wrot., Phila.....	15.00	15.00	15.00	15.50
No. 1 RR, wrot., Ch'go (net).....	12.00	12.00	12.00	14.25

Coke, Connellsburg,

Per Net Ton at Oven:				
Furnace coke prompt.....	\$2.50	\$2.50	\$2.60	\$2.75
Foundry coke, prompt.....	3.50	3.50	3.75	3.75

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	18.12 1/2	18.12 1/2	18.12 1/2	17.12 1/2
Electrolytic copper, refinery.....	17.75	17.75	17.75	16.75
Tin (Straits), New York.....	39.37 1/2	37.75	39.30	48.75
Zinc, East St. Louis.....	5.30	5.15	5.45	6.35
Zinc, New York.....	5.65	5.50	5.80	6.70
Lead, St. Louis.....	6.10	6.10	6.10	6.50
Lead, New York.....	6.25	6.25	6.25	6.65
Antimony (Asiatic), N. Y.....	8.87 1/2	8.75	8.12 1/2	9.62 1/2

aggregate tonnage placed in the last week was fairly satisfactory. In the meantime, shipments have shown improvement, particularly in the case of non-integrated steel companies, which have increased their operations rather sharply since the first of the month. It is reported in the trade that some of these companies have negotiated for their basic iron requirements for the remainder of the first quarter and that an additional merchant furnace may be blown in in a short time if present demand continues. However, open sales of basic iron have been practically negligible in the last few weeks, and shipments in November and December were very low. The other grades have been moving more steadily, with sales of a few carloads reported daily. In the absence of real tests, prices are quotable at the same levels as before. Lower quotations by Cleveland and Buffalo furnaces, particularly in competitive markets, have unsettled the situation somewhat, but sellers report that the quotations of \$18.50, Valley, for foundry and basic, and \$19 for malleable and Bessemer are still applying to current small-lot business. The Republic Iron & Steel Co. put in a blast furnace in the Youngstown district, while one of the stacks of the Weirton Steel Co. at Weirton, W. Va., has been blown out for rebuilding and enlarging.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel.—Buying of semi-finished steel has been negligible since the first of the year and, in view of this, the market is largely nominal from a price standpoint. The \$34, Pittsburgh or Youngstown, quotation is still the official market price, and although it might not stand the test of buying, the market has not yet be-

come established at lower levels. Shipments of crude steel are gradually improving, but fourth quarter contracts have not been executed in many cases, and there is no incentive for non-integrated companies to make further commitments at this time. Forging billets are holding at \$39, Pittsburgh, at which some contracts have been made. Wire rods are still quotable at \$40, Pittsburgh or Cleveland, and smaller buyers are under contract at this figure.

Bars, Shapes and Plates.—Tonnage releases are reaching mills in fair volume, and new orders are somewhat more numerous. This is due partly to the fact that prices have been somewhat better established in the last two weeks, and buyers are becoming convinced that figures lower than those quoted at present are not likely to appear. Although 1.80c., Pittsburgh, on plates and shapes can be done on large tonnages, buyers of small lots are forced to pay 1.85c. and 1.90c. in some cases. The bar price, which has shown more strength than that on plates and shapes, is no longer quotable at 1.90c., as this figure is now applying to little more than carload lots. However, 1.85c. seems to be the minimum, and, as the market becomes better established, it seems likely that bars will bring a premium of \$1 a ton over the other two heavy hot-rolled products. The automobile industry is now taking a fair bar tonnage, but some makers are unwilling to compete in the Detroit district at the low prices which are prevalent there, and the Pittsburgh district is probably not getting as large a share of the automobile bar tonnage as it does at some times. Demand for reinforcing bars is improving, and prospects are exceedingly good in that line. Structural awards have not been heavy in the last week, but bids will be opened this week on a bridge across the Ohio River at McKees Rocks, which will take 13,000 tons. A number of other large jobs are pending in the Pittsburgh district, but nothing has come out which has not been previously reported. The railroad car builders are increasing their plate specifications from week to week, but this tonnage has not yet reached the proportions which are expected.

Tubular Goods.—A gradual improvement in pipe demand is reported by most makers, although this line is dependent enough upon seasonal considerations to be slow at this time under normal circumstances. Most of the orders now coming to mills are for small tonnages representing feeder lines for large projects. Prospects for line pipe projects are good, a recent report indicating that the Sun Oil Co. is planning a line into Pittsburgh, which would require several hundred miles of pipe. A gas line from the Texas Panhandle into Chicago, which has been pending since last fall, is again active, and the pipe may be placed by spring. Demand for mechanical tubing for the automobile industry is improved slightly, but is still far from good. There is a fair amount of activity in boiler tubing.

Wire Products.—Demand for manufacturers' wire continues to show improvement, although the merchant items are dormant. Most buyers of nails and annealed fence wire are under contract for the present quarter at recently established prices and shipments are confined to small lots. The 2.40c., Pittsburgh, quotation on manufacturers' wire is being tested in the present market, and is reported to be holding on the ordinary run of business. Some large buyers in the Detroit district indicate that lower quotations have been made there, but have not been established.

Sheets.—Sheet business continues its recent improvement and has been accelerated in the last week by heavier automobile orders. Some of the larger motor car companies, which have been in production only in a small way, have stepped up output rather sharply, and February shipments to the automobile consuming industry are expected to show a large increase over those of January. The leading interest operated its mills last week at close to 70 per cent of capacity, and the average rate of the independent companies is probably about the same. Prices have shown no further irregularity, except that a quotation of 2.55c., Pittsburgh, on black sheets is reported to be more common in the Detroit territory. In nearly all cases, this is the base quotation with heavy extras and can hardly be said to repre-

THE IRON AGE Composite Prices

Finished Steel

Jan. 28, 1930, 2.305c. a Lb.

One week ago.....	2.312c.
One month ago.....	2.362c.
One year ago.....	2.391c.
10-year pre-war average.....	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

High

1929	2.412c., April 2:
1928	2.391c., Dec. 11:
1927	2.453c., Jan. 4:
1926	2.453c., Jan. 5:
1925	2.560c., Jan. 6:

Low

1929	2.362c., Oct. 29
1928	2.314c., Jan. 3
1927	2.293c., Oct. 25
1926	2.403c., May 18
1925	2.396c., Aug. 18

Pig Iron

Jan. 28, 1930, \$18.17 a Gross Ton

One week ago.....	\$18.17
One month ago.....	18.21
One year ago.....	18.42
10-year pre-war average.....	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High

1929	\$18.71, May 14:
1928	18.59, Nov. 27:
1927	19.71, Jan. 4:
1926	21.54, Jan. 5:
1925	22.50, Jan. 13:

Low

1929	\$18.21, Dec. 17
1928	17.04, July 24
1927	17.54, Nov. 1
1926	19.46, July 13
1925	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.85c. to 1.90c.
F.o.b. Chicago	1.95c. to 2.00c.
Del'd Philadelphia	2.17c. to 2.22c.
Del'd New York	2.19c. to 2.24c.
Del'd Cleveland	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Lackawanna	2.00c.
F.o.b. Birmingham	2.00c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c.

Billet Steel Reinforcing

	Base per Lb.
F.o.b. Pittsburgh mills, 40, 50, 60-ft.	1.95c.
F.o.b. Pittsburgh mills, cut lengths	2.20c.
F.o.b. Birmingham, mill lengths	2.00c.

Rail Steel

	Base per Lb.
F.o.b. mills, east of Chicago dist.	1.80c. to 1.90c.
F.o.b. Chicago Heights mill	1.85c.
Del'd Philadelphia	2.12c. to 2.22c.

Iron

	Base per Lb.
Common iron, f.o.b. Chicago	1.95c. to 2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.80c. to 1.90c.
F.o.b. Chicago	1.95c. to 2.00c.
F.o.b. Birmingham	2.00c.
Del'd Cleveland	1.99c. to 2.04c.
Del'd Philadelphia	2.00c. to 2.05c.
F.o.b. Coatesville	1.90c. to 1.95c.
F.o.b. Sparrows Point	1.90c. to 1.95c.
F.o.b. Lackawanna	1.90c. to 1.95c.
Del'd New York	2.02½c. to 2.07½c.
C.i.f. Pacific ports	2.25c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.80c. to 1.90c.
F.o.b. Chicago	1.95c. to 2.00c.
F.o.b. Birmingham	2.00c.
F.o.b. Lackawanna	1.90c. to 1.95c.
F.o.b. Bethlehem	1.90c. to 1.95c.
Del'd Cleveland	2.04c.
Del'd Philadelphia	1.86c. to 2.01c.
Del'd New York	2.04½c. to 2.09½c.
C.i.f. Pacific Ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.90c. to 2.00c.
Wider than 6 in., P'gh	1.80c. to 1.90c.
6 in. and narrower, Chicago	2.00c. to 2.10c.
Wider than 6 in., Chicago	1.90c. to 2.00c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c. to 2.20c.
Bars, f.o.b. Chicago	2.10c. to 2.20c.
Bars, Cleveland	2.10c. to 2.20c.
Bars, Buffalo	2.10c. to 2.20c.
Shafting, ground, f.o.b. mill	2.45c. to 3.40c.
Strips, P'gh	2.65c. to 2.75c.
Strips, Cleveland	2.65c. to 2.75c.
Strips, del'd Chicago	2.95c.
Strips, Worcester	2.80c. to 2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.00c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails	\$2.30 to \$2.40
Cement coated nails	2.30 to 2.40
Galvanized nails	4.30 to 4.40
	Base per Lb.
Polished staples	2.75c. to 2.85c.
Galvanized staples	3.00c. to 3.10c.
Barbed wire, galvanized	2.95c. to 3.05c.
Annealed fence wire	2.45c. to 2.55c.
Galvanized wire, No. 9	2.90c. to 3.10c.
Woven wire fence (per net ton to retailers)	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage

2.40c.

Spring wire

(Carload lots, f.o.b. Chicago)

Wire nails

\$2.35 to \$2.45 (keg)

Annealed fence wire

2.50c. to 2.60c. (lb.)

Bright hard wire to manufacturing trade

2.45c.

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Cut Nails

Per 100 Lb.

	Per 100 Lb.
Carloads, Wheeling, Reading or North-umberland, Pa.	\$2.70
Less carloads, Wheeling or Reading	2.80

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.20c. to 2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham	2.25c. to 2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.	2.35c. to 2.45c.
No. 13, del'd Philadelphia	2.57c. to 2.67c.
No. 13, blue annealed, B'ham	2.50c.

Continuous Mill Sheets

	Base per Lb.
No. 10 gage, f.o.b. P'gh	1.90c. to 2.00c.
No. 13 gage, f.o.b. P'gh	2.00c. to 2.15c.

(Usual range 24 in. to 48 in. wide)

Box Annealed, One Pass Cold Rolled

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.60c. to 2.75c.
No. 24, f.o.b. Chicago dist. mill	2.75c. to 2.85c.
No. 24, del'd Philadelphia	2.92c. to 3.07c.
No. 24, f.o.b. Birmingham	2.90c.

Metal Furniture Sheets

	Base per Lb.
No. 24, f.o.b. P'gh	4.00c.
	Galvanized
No. 24, f.o.b. Pittsburgh	3.30c. to 3.40c.
No. 24, f.o.b. Chicago dist. mill	3.40c. to 3.50c.
No. 24, del'd Cleveland	3.49c. to 3.59c.
No. 24, del'd Philadelphia	3.62c. to 3.72c.
No. 24, f.o.b. Birmingham	3.50c.

Tin Mill Black Plate

	Base per Lb.
No. 28, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill	3.00c. to 3.10c.
No. 20, f.o.b. Pittsburgh	3.90c.
No. 24, 8-lb. coating, f.o.b. mill	3.90c. to 4.00c.
No. 24, f.o.b. Pittsburgh	3.90c.

Long Ternes

	Base per Lb.
No. 24, f.o.b. Pittsburgh	3.90c.
	Vitreous Enameling Stock
No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Base per Lb.
No. 24, f.o.b. Morgantown or Pittsburgh	Per Base Box
	Standard cokes, f.o.b. P'gh district mills
No. 24, f.o.b. Gary	5.35

Terne Plate

	Base per Lb.

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sent the general market on sheets. Pittsburgh and Valley mills are quoting 2.65c., Pittsburgh, as the usual minimum and this figure applies on most of the tonnage now being placed. Galvanized sheets are quotable at 3.30c. to 3.40c., Pittsburgh, and blue annealed at 2.10c. and 2.25c., for the Nos. 10 and 13 gage respectively. Small buyers are called upon for a \$2 premium for the blue annealed product. Sheet makers are exceedingly dissatisfied with present quotations and advances are expected before the beginning of the next quarter if demand continues to improve. Automobile body sheets are holding at 3.90c., Pittsburgh, but concessions of as much as \$3 a ton have been made in fender stock and this product is now quotable at a range of 4c. to 4.15c., Pittsburgh, for the No. 20 gage. Fender stock ordinarily sells at a premium of 25c. a 100 lb. over auto body sheets, but the strip mill product has developed the lower figure. No changes in the other finishes of sheets are reported.

Tin Plate.—Operations in this district have declined slightly in the last week or two, on account of a stepping down in the schedules of the leading producer. The Pittsburgh mills do not share so largely in Pacific Coast business as Chicago producers, and just now demand from that part of the country is somewhat ahead of that from other districts. However, independent companies in this vicinity are running at a good rate, some of them at practical capacity, and present business is sufficient to warrant a continuance of such schedules.

Strip Steel.—Heavier specifications from the automobile industry have been received by local strip makers in the last week and operations have been increased to an average of 50 per cent for the entire industry. Cold-rolling mills have had the largest share of this increase, as hot mills were running at a considerably better rate than the cold-rolling units. The two largest makers of automobiles in the low-price range are contributing the greater part of the automotive tonnage, although other buyers are somewhat more active. Prices show little change, with all grades quotable at a \$2 range. Cold-rolled material is holding at 2.65c. to 2.75c., Pittsburgh or Cleveland, and hot-rolled at 1.90c. to 2c., for 6 in. and narrower, and 1.80c. to 1.90c. for material wider than 6 in.

Cold-Finished Steel Bars and Shafting.—Makers of cold-finished steel bars generally have recognized a decline of \$2 a ton in prices and are now quoting 2.10c., Pittsburgh. This revision follows a break in the price at Detroit, which had been imminent for several days. Quotations on turned and ground shafting have also been reduced and now stand at 2.45c. to 3.50c., depending upon size. Specifications for cold-finished steel are improving and lower quotations have developed considerable price stability. The narrow spread between prices of

cold-finished bars and merchant bars allows little or no profit for cold-finishing mills.

Coal and Coke.—The market on furnace coke has shown little change and surplus stock is still being disposed of in the open market at prices as low as \$2.50, Connellsville. Curtailment in production continues, but it now seems that the situation can hardly be expected to gain strength without a heavier demand. However, inquiry of a sizable nature seems to be somewhat closer than it was at the turn of the year. Heating coke is moving well, with some dealers sold up and practically out of the market. Shipments of foundry coke are light and new buying is negligible. The coal business is better from the standpoint of demand, but prices lack strength.

Warehouse Business.—Sales of steel products out of warehouse reflect the general improvement in business during the first two weeks of January, and demand is holding up fairly well. Prices have declined, particularly on black and galvanized sheets and wire and wire nails. Black sheets are now quotable at 3.60c. and galvanized at 4.25c., while wire nails are being sold at as low as \$2.65 a keg. Plates, structural shapes and soft steel bars are also weaker, with shading at 10c. a 100 lb. not uncommon. Cold-finished steel is holding fairly well, as jobbers did not advance prices when higher mill quotations prevailed last spring and are reluctant to quote lower figures at this time.

Old Material.—Despite increased open-hearth furnace operations in the Pittsburgh and nearby districts, scrap prices have eased off slightly. One mill paid only \$16.75 for a comparatively large tonnage of No. 1 heavy melting steel last week, and, in the absence of further sales at a higher price, this figure may now be considered the top of the market. An-

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	2.90c. to 3.00c.
Structural shapes	2.90c. to 3.00c.
Soft steel bars and small shapes	2.80c. to 2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.60c.
Galv. sheets (No. 24), 25 or more bundles	4.25c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.25c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.40c.
Galv. corrug. sheets (No. 28), per square	4.13c.
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count	60 per cent off list
Machine bolts, 100 count	60 per cent off list
Carriage bolts, 100 count	60 per cent off list
Nuts, all styles, 100 count	60 per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'l'd, base per 100 lb.	\$2.75 to \$2.85
Wire, galv. soft, base per 100 lb.	3.20 to 3.30
Common wire nails, per keg	2.60 to 2.75
Cement coated nails, per keg	2.65 to 2.80

other consumer bought a smaller tonnage at an even lower figure, and some buyers report that \$16.50 has become a rather common offering price. In the meantime, dealers have been paying up to \$16.75 to cover against recent orders, although scrap can still be bought for less. Under these circumstances, No. 1 heavy melting steel is quotable this week at \$16.25 to \$16.75, a decline of 25c. a ton. Further mill buying might be expected to push the price up on very short notice. Hydraulic compressed sheets are also weak on the basis of recent sales, a large tonnage having been sold at \$16.50. Previous sales brought a somewhat higher figure, but the market has eased off since that time, and one mill is said to have been offered a substantial tonnage at \$16.25. Bundled sheets and scrap rails have also declined, but a sale of blast furnace material during the week brought an advance of 50c. on borings and turnings. Specialties are also slightly stronger in a quiet market. The trend of the market is rather uncertain just now, but will undoubtedly be clarified somewhat by railroad lists which will be sold next week. The Pennsylvania list contains 41,000 tons, including 4600 tons of heavy melting steel and 7100 tons of rails. It closes on Feb. 5. The Baltimore & Ohio list contains 13,500 tons and closes on Feb. 3.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel	\$16.25 to \$16.75
No. 2 heavy melting steel	14.50 to 15.00
Scrap rails	16.00 to 16.50
Compressed sheet steel	16.25 to 16.50
Bundled sheets, sides and ends	14.00 to 14.50
Cast iron carwheels	14.50 to 15.00
Sheet bar crops, ordinary	18.00 to 18.50
Heavy breakable cast	12.00 to 12.50
No. 2 railroad wrought	16.25 to 16.75
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	11.50 to 12.00

Acid Open-Hearth Grades:

Railr. knuckles and couplers	20.00 to 21.00
Railr. coil and leaf springs	20.00 to 21.00
Rolled steel wheels	20.00 to 21.00
Low phos. billet and bloom ends	21.00 to 22.00
Low phos. mill plates	20.50 to 21.00
Low phos. light grades	19.50 to 20.50
Low phos. sheet bar crops	20.50 to 21.00
Heavy steel axle turnings	14.00 to 14.50

Electric Furnace Grades:

Low phos. punchings	18.50 to 19.50
Hvy. steel axle turnings	14.00 to 14.50

Blast Furnace Grades:

Short shoveling steel turnings	12.00 to 12.50
Short mixed borings and turnings	12.00 to 12.50
Cast iron borings	12.00 to 12.50

Rolling Mill Grades:

Steel car axles	19.50 to 20.50
Cupola Grades:	

No. 1 cast	14.00 to 15.00
Rails 3 ft. and under	18.50 to 19.50

The Welded Products Corporation, 1645-1655 Cleveland Avenue, Kansas City, Mo., has acquired the assets and has assumed the liabilities of the Economy Electrical Mfg. Co., manufacturer of electrical equipment. Sales and production effort will be concentrated on items that have proved profitable, including Welco welders, Electro-Kabinets and Sit-Rite chairs. Unprofitable items have been discontinued.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$34.00
Rerolling, 4-in. and under 10-in., Youngstown	34.00
Rerolling, 4-in. and under 10-in., Cleveland	34.00
Rerolling, 4-in. and under 10-in., Chicago	35.00
Forging quality, Pittsburgh	39.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$34.00
Youngstown	34.00
Cleveland	34.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	\$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$40.00
Cleveland	40.00
Chicago	41.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
<i>Foreign Ore, c.i.f. Philadelphia or Baltimore</i>	
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$15.50 to \$16.50
<i>Per Gross Ton</i>	
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
<i>Per Lb.</i>	
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50 to 2.60
Foundry, f.o.b. Connellsville prompt	3.50 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, 4-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	\$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	\$88.50
75%	130.00
10%	\$35.00
11%	\$37.00
12%	\$39.00
14 to 16%	45.00

Bessemer Ferrosilicon

	Per Gross Ton	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	10%	\$26.00 to \$28.00
	12%	28.00 to 30.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton	Per Gross Ton	
6%	\$22.00 to \$23.00	10%	\$26.00 to \$28.00
7%	23.00 to 24.00	11%	28.00 to 30.00
8%	24.00 to 25.00	12%	30.00 to 32.00
9%	25.00 to 26.00		

Other Ferroalloys

Ferro tungsten, per lb. contained metal del'd \$1.40 to \$1.50

Ferro chromium, 4 to 6% carbon and up, 65 to 70% Cr, per lb. contained Cr, delivered, in carloads

Ferro vanadium, per lb. contained vanadium, f.o.b. furnace \$3.15 to \$3.65

Ferro carbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads \$160.00

Ferro phosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton \$91.00

Ferro phosphorus, electric 24%, f.o.b. Alton, Ill., per gross ton \$122.50

Fluxes and Refractories

Fluorspar

Per Net Ton

Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	\$18.25 to 18.75
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

Per 1000 f.o.b. Works

High-Heat Intermediate

Duty Brick Heavy Duty Brick

Pennsylvania	\$43.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	
Ohio	48.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton		7.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

Per Net Ton

Standard size	\$45.00
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Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine bolts .70

Carriage bolts .70

Lag bolts .70

Plow bolts, Nos. 1, 2, 3 and 7 heads .70

Hot-pressed nuts, blank or tapped, square .70

Hot-pressed nuts, blank or tapped, hexagons .70

C.p.c. and t. square or hex nuts, blank or tapped .70

Washers* 7.00c. to 6.75c. per lb. off list

Chicago

Steel Demand Increasing More Rapidly Than Expected, and Delivery Dates Are Being Extended

CHICAGO, Jan. 28.—The upturn in demand for finished steel products is more marked than had been expected by producers, and the resultant forward dating of promises of delivery is coming as a surprise to consumers. Western mills are finding it difficult to bring in new capacity rapidly enough to meet the improved demand.

Two blast furnaces have been lighted at Gary, bringing the count for the leading producer to eight at Gary, six at South Works and one at Joliet. Total steel mill furnaces in operation now stand at 24 out of 36 in the district. Another producer is using 21 of its 27 open-hearth furnaces, so that ingot output reaches close to 80 per cent of capacity, a gain of eight points in the week.

Consumers in many lines are using steel faster than they had contemplated earlier in the month, and repeat orders, as well as purchases for the remainder of the quarter, are more numerous. Mill schedules are better arranged than at any time so far this year and "over the counter" service can no longer be expected by buyers. Roll changes are less frequent and, as a result, deliveries, especially on mixed lots, are less satisfactory. However, the character of orders indicates a wide practice of taking steel only as needed, and mills are still in position to add tonnages to current rollings. While some finished steel products may be had promptly, others in certain sizes cannot be shipped in less than three to four weeks. The easing of prices for plates, shapes and bars, noted in recent weeks, has spread to the point where most sellers are freely accepting attractive tonnages at 1.95c. a lb., Chicago. The price of 2c. is still common on orders for mixed lots, while the lower quotation is brought out not alone by the size of the tonnage, but by the character of the specifications.

New business and specifications recently booked place Western steel plants in a favorable position for still further gains in operations in the early part of February.

Ferroalloys.—Of special note in this market is the increase in specifications for all ferroalloys. New buying is of little moment.

Bolts, Nuts and Rivets.—Specifications from manufacturers of farm equipment and builders of automobiles are largely responsible for an increase in output to 70 per cent of capacity. Total shipments in January are practically equal to those of the same month last year.

Pig-Iron.—Shipments of Northern iron continue to climb and, with one furnace out for relining, demand is a trifle larger than the current make. Stock piles are shrinking, but the rate is slow. Deliveries for January are fully 30 per cent above those of December, and releases on hand now assure a substantial gain in the movement in February. A year ago the peak of shipments was reached in March, with April a very close second. The character of the market is clearly indicated by the fact that close

to 40 per cent of sales are for prompt delivery, and somewhat less than 8 per cent are for shipment in the second quarter. Specifications for silvery are larger from practically all sources, and new sales in the immediate vicinity of Chicago total 800 tons.

Prices per gross ton at Chicago:
N'th'n No. 2 fdy., sil. 1.75 to 2.25.. \$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75.. 20.50
Malleable, not over 2.25 sil..... 20.00
High phosphorus 20.00
Lake Super, charcoal, sil. 1.50..... 27.04
S'th'n No. 2 fdy. (all rail) .. \$19.01 to 19.51
Low phos., sil. 1 to 2, copper free.. 29.50
Silvery, sil. 8 per cent.... \$28.79 to 29.79
Bess. ferrosilicon, 14-15 per cent... 46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Sheets.—The Western sheet market shows little change in the week. Notwithstanding that several lines of manufacturing which draw heavily against sheet mills are busier, both new buying and specifications are at extremely close range. Heavier shipments are being made to automobile manufacturers. Makers of containers and barrels are well engaged. Producers of drain pipe and gutters report an active demand in the South, and they are now taking sheets which will be made up to meet demand for roofing materials in the Middle West. Shipments to builders of agricultural machinery are heavy. Jobbers are finding wider distribution for sheet

Warehouse Prices, f.o.b Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinfor'g bars, billet steel. 1.95c. to 2.45c.	
Under 5 tons.....	2.85c.
5 tons to 30 tons.....	2.45c.
30 tons and over.....	2.00c.
Reinfor'g bars, rail steel.....	1.80c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands ($\frac{1}{4}$ in. in Nos. 10 and 12 gages).....	3.20c.
Hoops (No. 14 gage and lighter).....	3.75c.
Black sheets (No. 24).....	4.05c.
Galv. sheets (No. 24).....	4.80c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes, $\frac{1}{4}$ in. and larger.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws.....	60
Hot-pressed nuts, sq., tap, or blank.....	60
Hot-pressed nuts, hex., tap, or blank.....	60
No. 8 black ann'l'd wire, per 100 lb. \$3.45	
Com. wire nails, base per keg. \$2.85 to 2.95	
Cement c't'd nails, base per keg	2.85 to 2.95

mill products. All told, buying for prompt delivery is amply supporting output at between 70 and 75 per cent of hot mill capacity, which is a substantial gain over the rate of a week ago. Deliveries range from 10 days to two weeks on galvanized and blue annealed sheets and from seven to 10 days on black. Mill prices are steady at 2.20c. to 2.30c. a lb. for No. 10 blue annealed sheets, 2.75c. to 2.85c. for black, and 3.40c. to 3.50c. for galvanized sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.80c. to 2.90c.; No. 24 galv., 3.45c. to 3.55c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Cast Iron Pipe.—This market is expanding, and the outlook is now more favorable than at any time so far this year. Public utilities are actively interested in the market, though orders placed in the week were not impressive. The United States Pipe & Foundry Co. is low bidder at \$44.50 a ton on 700 tons of Class C pipe, 6 to 16-in. diameters, for Wauwatosa, Wis. Bids by the American Cast Iron Pipe Co., Lynchburg Foundry Co. and James B. Clow & Sons were all at \$45.50 a ton, delivered. Among purchases this week were 1000 tons of 6 to 24-in. pipe by South Bend, Ind., from an unnamed bidder, and 3000 ft. of 4-in. and 6000 ft. of 6-in. pipe by Bay City, Mich. The McWane Cast Iron Pipe Co. has received an order for 300 tons of 4, 6 and 8-in. pipe for delivery at Sweet Springs, Mo.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$42.20; 4-in., \$46.20; Class A and gas pipe, \$3 extra.

Cold-Finished Steel Bars.—Going prices for this commodity are 2.10c. a lb., Chicago. Urgent requests for prompt delivery are more numerous and output is higher than a week ago.

Cold-Rolled Strip.—Most of the new orders are being taken at 2.65c., Cleveland, or 2.95c., delivered Chicago. Quotations of 2.75c., Cleveland, are reported practically to have disappeared from the market. New buying and specifications continue to grow heavier, but at a slower pace than earlier in the month. Output is averaging close to 45 per cent of capacity for the country as a whole. Several orders for cold-rolled strip have been placed by automobile manufacturers in anticipation of needs beyond the immediate future.

Wire Products.—Gains in specifications and new orders for manufacturers' wire are of moderate size, though interest is more widespread and the outlook for measurably heavier output is favorable. Rivet and bolt makers which serve automobile manufacturers are still operating at light capacity and therefore do not have large use for wire mill products. Prices for bright hard wire to the manufacturing trade are holding at 2.45c. a lb., Chicago. Shipments to the jobbing trade are no larger except to the South, where open weather is permitting outdoor work. The Cen-

tral and Northwestern States are blanketed by snow and still experiencing low winter temperatures. On this score, jobbers are standing by, with little attention being given to early spring demand. Books are heavy for large power cables, such as those used by public utilities, and fresh inquiries promise added business in the early spring.

Rails and Track Supplies.—With the bulk of 1930 rail needs placed, new buying is confined to small odd lots. Specifications are expanding and output is slowly growing. Schedules now being arranged point to about March 1 as the time when peak production will be reached. Several new purchases of track supplies total 6000 tons. Fresh inquiries are large, and it is probable that two or three railroads will contract for large tonnages in the week. Producers of track accessories are gradually expanding output, as spring track-laying activities draw near. New business in light rails is confined to scattered orders of carlot proportions.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bessemer rails, \$42; light rails, rolled from billets, \$36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Reinforcing Bars.—This market remains seasonably dull. There are, however, numerous signs which point to more activity. The school board at Chicago is taking figures on several elementary school structures and contemplates readvertising for bids on a large high school project. Bids will soon be taken on a round tonnage for the superstructure of a power house addition to the Waukegan, Ill., property of the Public Service Co., and bids will soon be requested on reinforcing steel for an addition to the plant of the Stateline Generating Co., Hammond, Ind. The State of Illinois is placing a number of small tonnages for institutional structures and will soon ask for bids for a new cell house for Joliet. Bar benders are operating on short hours and are carrying light stocks in warehouses.

Old Material.—About 8000 tons of heavy melting steel has been purchased by a consumer at \$13.25 a gross ton, delivered. This is the first consumer buying in many weeks. From the viewpoint of brokers, the price paid was not in line with expectations. However, brokers point to greater activity in the finished steel market as a favorable sign of growing use of steel mill scrap. It is reported that about 4000 tons of cast iron borings has been taken by a consumer at \$10.25 a ton. Cast iron car wheels, a grade that long has been dormant, is moving at 25c. a ton above quotations of last week. Pressure for deliveries by small users is insistent. Malleable and steel foundries in outlying districts are busier and are drawing on Chicago for immediate shipments of needed scrap. It is not uncommon for foundry operators to place repeat orders at close intervals. Winter weather continues to hamper the

gathering and preparing of scrap. This is indicated by the current list of the Chicago & North Western, which at 1000 tons, is unusually small. The Milwaukee road will sell 4000 tons and the Fisher body plants are offering 61 cars of bundles for February.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:

Heavy melting steel.....	\$12.75 to \$13.25
Shoveling steel.....	12.75 to 13.25
Frogs, switches and guards, cut apart, and misc. rails.....	14.00 to 14.50
Hydraulic compressed sheets.....	11.50 to 12.00
Drop forge flashings.....	9.75 to 10.25
No. 1 busheling.....	11.00 to 11.50
Forg'd cast and r'l'd steel carwheels.....	17.50 to 18.00
Railroad tires, charg. box size.....	17.50 to 18.00
Railroad leaf springs cut apart.....	17.50 to 18.00

Acid Open-Hearth Grades:

Steel couplers and knuckles.....	16.00 to 16.50
Coil springs.....	18.00 to 18.50

Electric Furnace Grades:

Axle turnings.....	12.75 to 13.25
Low phos. punchings.....	15.50 to 16.00
and under.....	15.50 to 16.00

Blast Furnace Grades:

Axle turnings.....	10.75 to 11.25
Cast iron borings.....	9.75 to 10.25
Short shoveling turnings.....	9.75 to 10.25
Machine shop turnings.....	7.75 to 8.25

Rolling Mill Grades:

Iron rails.....	14.50 to 15.00
Rerolling rails.....	14.75 to 15.25

Cupola Grades:

Steel rails less than 3 ft.....	16.75 to 17.25
Steel rails less than 2 ft.....	18.50 to 19.00
Angle bars, steel.....	15.50 to 16.00
Cast iron carwheels.....	14.00 to 14.50

Malleable Grades:

Railroad.....	16.75 to 17.25
Agricultural.....	14.50 to 15.00

Miscellaneous:

*Relaying rails, 56 to 60 lb.....	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:

Iron angle and splice bars.....	15.00 to 15.50
Iron arch bars and transom bars.....	17.00 to 17.50
Iron car axles.....	25.50 to 26.00
Steel car axles.....	16.00 to 16.50
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	11.50 to 12.00
No. 1 busheling.....	9.00 to 9.50
No. 2 busheling.....	7.00 to 7.50
Locomotive tires, smooth.....	15.50 to 16.00
Pipes and flues.....	9.50 to 10.00

Cupola Grades:

No. 1 machinery cast.....	13.50 to 14.00
No. 1 railroad cast.....	13.00 to 13.50
No. 1 agricultural cast.....	12.00 to 12.50
Stove plate.....	10.75 to 11.25
Grate bars.....	10.75 to 11.25
Brake shoes.....	10.75 to 11.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Bars.—Soft steel bars are commonly quoted at 1.95c. to 2c. a lb., Chicago. The lower price holds on attractive tonnages. Demand for bars is showing rapid growth from widely diversified users. Car companies are freely entering specifications, and forge shops, many of which cater to automobile manufacturers, are taking larger quantities. New buying is at close range and for nearby delivery. Business of this character is in such volume that promises of delivery are being lengthened to two weeks on some sizes. The iron bar market is quiet. Specifications are growing slowly in volume. New buying and releases for alloy steel bars are broadening and output has been increased to 60 per cent of capacity. The recently announced price of 1.85c. a lb., Chicago Heights, for rail steel bars has had little effect on driving in business. Current orders, which are for prompt delivery, are holding production to the rate of a year ago.

Plates.—Of foremost interest in this market is the placing by the Milwaukee road of 2300 cars requiring close to 30,000 tons of steel. Winter weather is holding in check construction of gas and oil lines and, as a result, little plate tonnage is going into the manufacture of line pipe. Two refiners in the Southwest have ordered 3000 tons of plates for tank construction. Fresh inquiry is for 5000 tons and total projects of this kind before the trade will take 14,000 tons. Current quotations on plates are at 1.95c. to 2c. a lb., Chicago, the lower price being named on attractive tonnages.

Structural Material.—From the viewpoint of awards, this market is quiet except in outlying sections of the West. Several tonnages for bridge work, both highway and railroad, have been added to fabricators' books. Inquiry is more active from a wide territory, and a greater number of estimates are being prepared on small tonnages. A building at Des Moines, Iowa, will take 2400 tons and a public utility structure at Springfield, Ill., calls for 1700 tons. The Illinois Steel Co.'s expansion program is well under way in fabricating shops. Shops in Chicago and Milwaukee are in need of work, and small tonnages are being eagerly sought. Quotations on structural shapes are 1.95c. to 2c., Chicago.

Mill prices on plain material, per lb.: 1.95c. to 2.00c. base, Chicago.

Coke.—Increase in the melt of pig iron is reflected in heavier orders for by-product foundry coke. Prices are firm at \$8 a ton, f.o.b. local ovens.

1100-Ton Blast Furnace Soon to Blow In

National Steel Corporation has closed down its No. 1 blast furnace at the Weirton Steel Co. plant, Weirton, W. Va., for reconstruction. The new No. 1 furnace, which will be completed and in operation early in April, will have a capacity of more than 1100 tons and, it is claimed, will be the largest in the world.

German Aluminum Foil Exports Increase

HAMBURG, GERMANY, Jan. 13.—Exports of aluminum foil have shown a considerable increase in the past five years, reaching a total of 9,918,000 lb. in 1929, or about 15 per cent of the total German aluminum production. While the price of aluminum foil was 6.10 m. per kg., or 65.24c. per lb., in 1926, it was gradually reduced to 4 m. per kg., or 43.45c. per lb., in 1929. At the end of last year even 4 m. per kg. was slightly shaded on large lots of foil. Exports of aluminum foil to the United States last year reached a total of 1,542,800 lb.

Cleveland

Steel Volume Makes Further Gain, Chiefly in Bars and Sheets for Automobile Industry

CLEVELAND, Jan. 28.—The volume of steel business showed a little further gain the past week, although the improvement was confined mostly to steel bars and sheets. Activity outside of the motor car industry is still rather light, and there is a scarcity of orders for structural shapes and plates. One local open-hearth furnace was started during the week and Cleveland mills have got up to about 70 per cent of ingot capacity.

Reports indicate enlarged operations by several of the Michigan automobile manufacturers. Schedules of the Ford Motor Co. and the Chevrolet Motor Co. call for quite an increase in output in February and a rather sharp stepping up in March. The Chevrolet company during the week issued releases to several sheet mills for round lots of sheets for Feb. 15 to March 15 shipment. Local stamping plants and forge shops doing automotive work are getting busier, but are not operating at capacity.

While pressure for lower prices has been rather persistent, the market has a firmer tone except on sheets and strip steel. However, these products are holding at recent levels, with the exception of a \$3 a ton reduction on fender stock.

Pig Iron.—The increase in volume of business reported a week ago held up in the past week. Sales by Cleveland interests of foundry and malleable iron aggregated 33,000 tons, or practically the same as during the previous week. However, the business was more scattered. Many foundries are still using iron carried over from the fourth quarter and others are hesitating because they are still doubtful that present prices will hold. The market appears to be fairly steady. Cleveland furnaces are not always maintaining the \$18.50 base for outside shipment, where they have a freight disadvantage, but are getting \$18.75 for shipment to some nearby points. Concessions have been made by another furnace to a price that, if figured back, was below the \$18.50, Valley base. In Michigan, the price range is unchanged at \$19.50 to \$20, furnace. Southern iron is holding at \$13.50, Birmingham, in this district. The 4000 tons of malleable iron reported placed last week by a Muncie, Ind., consumer is believed to have gone to a Chicago steel company. Shipping orders have continued to increase. Good-sized lots were released during the week by malleable foundries in Michigan, making castings for the Ford Motor Co. Shipments in good volume are now going to the motor car, farm implement and heating equipment industries and to foundries specializing on railroad work.

Iron Ore.—The consumption of Lake Superior ore during December was 4,076,432 tons, a decrease of 624,493 tons from November. The amount consumed in December, 1928, was 4,996,828 tons. Ore at furnaces Jan. 1 amounted to 31,503,307 tons and the amount at furnaces and Lake Erie docks on that date was 37,645,871 tons, as compared with 35,147,088 tons on the same date a year ago. Central district furnaces during December consumed 1,974,314 tons, a decrease of 289,199 tons. Lake front

furnaces used 1,892,224 tons, a decrease of 318,996 tons. Eastern furnaces consumed 111,914 tons, a loss of 3388 tons, and all-rail furnaces melted 97,980 tons, a falling off of 12,910 tons. There were 139 furnaces in blast using Lake ore Dec. 31, a decrease of 16 for the month.

Prices per gross ton at Cleveland:	
N'th'n fdv., sil. 1.75 to 2.25	\$19.50
S'th'n fdv., sil. 1.75 to 2.25	19.51
Malleable	19.50
Ohio silvery, 8 per cent...	28.00
Basic Valley furnace	18.50
Stand. low phos., Valley...	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Semi-finished Steel.—Specifications have continued to increase slightly, and the leading local producer is now operating 11 out of 14 open-hearth furnaces. Sheet bars, billets and slabs are quoted at \$34, Cleveland and Youngstown, and shipments against contracts are being made at this price.

Bolts, Nuts and Rivets.—Demands for bolts and nuts increased the past week, orders having been more plentiful from the automotive industry and railroads. Rivets are also moving slightly better. Prices are well maintained.

Cold-finished Steel Bars.—Recent concessions of \$2 a ton on cold-finished steel bars have resulted in a corresponding reduction in the price to 2.10c., Cleveland, and other basing points. First quarter contracts are being revised accordingly. Specifications continue to gain slowly.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinfor. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to $\frac{1}{2}$ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*.95c.
Black sheets (No. 24)	3.75c.
Galvanized sheets (No. 24)	4.50c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	\$2.60
No. 9 galv. wire, per 100 lb.	3.05
Com. wire nails, base per keg	2.65

*Net base, including boxing and cutting to length.

Bars, Plates and Shapes.—Demand for steel bars is slowly expanding. The business, for the most part, is coming from the automotive industry. Plate tonnage is light, although the demand for small lots from tank builders has improved somewhat. The placing of 40 locomotives and 15 tenders by the Van Sweringen railroad interests with the Lima Locomotive Works will bring a sizable plate tonnage to this territory. Structural shapes are inactive. Not much building work is coming out, and local fabricating shops need orders. Steel bars are generally quoted at 1.85c., Cleveland, by both local and outside mills. Plates and shapes appear to be holding firmly at 1.85c., Pittsburgh, in this market, and 1.90c. contracts have been revised to the lower price. On light plates, plate mills are confronted with strip mill competition, with a considerably lower range in prices.

Old Material.—The market is somewhat more active than early in the month, reflecting increase in mill operations. Prices are fairly firm on most grades, and dealers in some cases are offering more than mills. A local mill during the week purchased a small tonnage of selected No. 1 heavy melting steel scrap at \$15, and dealers are paying \$14.50 for this grade. A local mill is offering \$10.25 for machine shop turnings, but dealers are reported to have paid as high as \$10.50. Borings and turnings have advanced 25c. a ton, dealers paying \$10.75 or higher for this scrap. However, No. 2 busheling has declined, owing to a falling off in the demand that is attributed to a reported discontinuance of the use of this grade by some blast furnaces.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$13.50 to \$14.00
No. 2 heavy melting steel	13.00 to 13.50
Compressed sheet steel	12.50 to 13.00
Light bundled sheet stampings	
Drop forge flashings	12.00 to 12.50
Machine shop turnings	9.75 to 10.25
Short shoveling turnings	10.50 to 11.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00

Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet, bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50

Blast Furnace Grades:	
Cast iron borings	10.25 to 10.75
Mixed borings and short turnings	10.25 to 10.75
No. 2 busheling	9.75 to 10.25

Cupola Grades:	
No. 1 cast	15.25 to 15.75
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50

Miscellaneous:	
Railroad malleable	18.00 to 18.50
Rails for rolling	16.25 to 16.50

Sheets.—Orders increased somewhat during the week, and some of the mills for the first time in two or three months have accumulated a moderate backlog. Auto body sheets are more active than other grades. However, electrical sheets are moving

fairly well and metal furniture sheets show more life. There is virtually no change in the price situation. On black sheets, 2.55c., Pittsburgh, is being quoted to some of the large buyers in the Detroit territory, although a few mills are holding out for higher prices, seeing no profit in the low levels. Blue annealed sheets are pretty generally quoted by jobbing mills at 2.10c. for No. 10 and at 2.25c. for No. 13. On galvanized sheets, 3.30c. is rather common. Consumers generally are ordering for early requirements, and mills are not disposed to sell for extended deliveries at present prices.

Strip Steel.—Some of the mills report a gain in orders for hot-rolled strip. Prices have settled to a flat size.

1.80c. for wide strip and 1.90c. for narrow. Cold-rolled strip is quiet. On this, 2.65c., Cleveland, is generally quoted. Fender stock has again declined, having been marked down \$3 a ton to 4c., Cleveland and Pittsburgh, for No. 20 gage.

Coke.—Demand for foundry coke shows some increase, particularly from automobile foundries. Most consumers have placed first half contracts. Ohio by-product foundry coke has been reestablished at \$8.25, Painesville, for February shipment. Connellsville grades range from \$3.25 to \$4.85. The recent cold weather has stimulated the demand for by-product coke for domestic use, which is unchanged at \$4.50, Ohio ovens, for egg size.

may be upward if the present attitude of sales executives is reinforced by a further improvement in business. A week ago the plate market was the focal point of price weakness. Since that time the situation has steadied somewhat from the fact that certain of the Eastern mills are declining to recognize the low price competition, and are adhering to a

New York

Rise in Structural Awards Features Improved Steel Business—Pig Iron Demand Passive

NEW YORK, Jan. 28.—Pig iron demand is still passive, with inquiries few and sales, in most cases, resulting from active canvassing by sellers. While melters are reluctant to commit themselves very far ahead, they are buying as their needs arise and usually ask prompt deliveries. Bookings in this territory, at 7500 tons, were slightly larger than in the previous week. Foundry operations are spotty, but pig iron shipments are going forward with few suspensions. The amount of pig iron shipped by a leading seller to date this month is within three tons of the total for the same period in January, 1929. The total current movement in this district, however, is believed to be considerably smaller than in November, when the last of the barge shipments were being made. A certain amount of storage iron is always taken in by melters before the close of the season of navigation. The A. P. Smith Mfg. Co., East Orange, N. J., has closed against its inquiry for 300 tons for next quarter. Rice, Barton & Fales, Inc., Worcester, Mass., has placed 1000 tons, and the Ingersoll-Rand Co., Phillipsburg, N. J., has bought 500 tons. The Foran Foundry & Mfg. Co., Flemington, N. J., is in the market for 600 tons of foundry iron. Buffalo foundry iron continues to range from \$16.50 to \$17, furnace, for No. 2 plain. Eastern Pennsylvania iron is on a competitive basis, particularly for New Jersey deliveries. Alabama iron for water shipment is reported more of a market factor.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	\$21.41 to \$21.91
*Buff. No. 2, del'd east N. J.	19.78 to 20.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	19.89 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.39 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Cast Iron Pipe.—Manufacturers of pressure pipe are bidding on a fair tonnage of business for private users, but municipalities have not yet inquired extensively. There is a strong upward movement in prices, and on recent public bids the minimum quotation figured back to about \$36 a net ton, f.o.b. Northern foundry. Jersey City, N. J., has opened bids on 150 tons of water pipe, the low bidder on which was R. D. Wood & Co. The low bid on 600 tons of pipe for Providence, R. I., was put in by the United States Pipe & Foundry Co., which quoted \$40.85 a net ton, delivered. Recent inquiries have included upward of 1000 tons of pipe for the Interstate Equipment Corporation, Elizabeth, N. J., and a small tonnage of 48-in. pipe included in a contract for Yonkers, N. Y.

Prices per net ton deliv'd New York:
Water pipe, 6-in. and larger, \$38.60;
4-in. and 5-in., \$41.60; 3-in., \$48.60.
Class A and gas pipe \$3 extra.

Reinforcing Bars.—With inquiries and awards mostly in small tonnages, the market is inactive in the metropolitan district. Prices remained at 2.20c., Pittsburgh, and 2.54c. delivered New York, for stock shipments from mills in cut lengths. An award of 500 tons for a warehouse in Long Island City, N. Y., went to the Concrete Steel Co.

Warehouse Business.—Current buying from stock is limited. Demand for sheets is light, and concessions in prices range up to \$3 a ton on black and \$5 a ton on galvanized.

Finished Steel.—A rise in structural steel awards to 18,000 tons in New York City alone features a steel situation, which, from the viewpoint of demand, is more than meeting the most sanguine expectations. On the score of prices, the situation is not so pleasing to the steel mills, except that recent reductions have brought most quotations to a point of stabilization, from which the next move

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock	
Rounds and hexagons	3.50c.
Flats and squares	4.00c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'd sheets (No. 10)	3.25c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger	3.40c.
Smooth finish, 1 to $2\frac{1}{2}$ x $\frac{1}{4}$ in. and larger	3.75c.
Open-hearth spring steel, bases	
	4.50c. to 7.00c.
Machine bolts, cut threads	
$\frac{3}{4}$ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread	
$\frac{1}{2}$ x 6 in. and smaller	60
$\frac{3}{4}$ x 20 in. and smaller	50 to 50 and 10
Coach Screws	
$\frac{1}{2}$ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10
Boiler Tubes	
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
1/2-in. butt	46	29
3/4-in. butt	51	37
1-3/4-in. butt	53	39
2 1/2-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12

Wrought Iron—

1/2-in. butt	5	+19
3/4-in. butt	11	+9
1-1 1/2-in. butt	14	+6
2-in. lap	5	+14
3-6-in. lap	11	+6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	\$6.45	\$6.20
Charcoal, per Box—	A	AAA
IC	\$9.70	\$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	\$10.00 to \$11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.60c. to 3.70c.
No. 22	3.75c. to 3.85c.
No. 24	3.80c. to 3.90c.
No. 26	3.90c. to 4.00c.
No. 28*	4.05c. to 4.15c.
No. 30	4.30c. to 4.40c.

Sheets, Galvanized

	Per Lb.
No. 14	4.00c. to 4.15c.
No. 16	3.85c. to 4.00c.
No. 18	4.00c. to 4.15c.
No. 20	4.10c. to 4.25c.
No. 22	4.20c. to 4.35c.
No. 24†	4.35c. to 4.50c.
No. 26	4.60c. to 4.75c.
No. 28*	4.85c. to 5.00c.
No. 30	5.25c. to 5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

†For 50 bundles or more, 25c. per 100 lb. or less.

range of 1.90c. to 1.95c., Coatesville, Pa., or 2.07 $\frac{1}{2}$ c. to 2.12 $\frac{1}{2}$ c., New York. Carload orders have been taken within the week at the higher figure, and some jobbers and a few of the larger buyers have been able to place business at 2.02 $\frac{1}{2}$ c. A shipyard is reported to have bought 100 tons for a tugboat at the latter figure. Meanwhile, quotations of less than 2.02 $\frac{1}{2}$ c. have also appeared, but not so frequently as a week or two ago. Steel bar prices are revised this week to a range of 2.19c. to 2.24c., New York, the lower figure based on 1.85c., Pittsburgh, to which some of the mills have been forced to go. A few weeks ago orders were taken for a brief time at 1.85c., and in the case of one mill at 1.80c., but efforts were made to stiffen the quotation to 1.90c., Pittsburgh. The coverage at lower figures apparently had been too widespread to make this move thoroughly effective. On other products there have been no further changes, although the lower figures in the price ranges have been applying on a large proportion of the business. For example, 2.65c., Cleveland or Pittsburgh, is so common on cold-rolled strip that 2.75c. quotations may be said to have almost disappeared. Cold-finished steel bars have settled quite generally to 2.10c., Pittsburgh, Cleveland or Buffalo. Black sheets are not strong at current quotations. Structural awards of the week included 8000 and 7000 tons for two office buildings, 1500 and 1000 tons for two apartment buildings and 550 tons for a hospital addition. New subway work adds about 18,000 tons to pending business.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.19c. to 2.24c.; plates, 2.02 $\frac{1}{2}$ c.; structural shapes, 2.04 $\frac{1}{2}$ c. to 2.14 $\frac{1}{2}$ c.

Coke.—Furnace coke prices are substantially unchanged, with quotations ranging from \$2.65 to \$2.75 per net

ton, Connellsburg, and distress car-loads of standard grade occasionally offered at \$2.50 a ton. Special brands of beehive foundry coke are \$4.85 a net ton, ovens, or \$8.56, delivered to Northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn. By-product coke is quoted at \$9 to \$9.40 a net ton, Newark or Jersey City, and \$10.06, New York or Brooklyn.

Old Material.—All grades of scrap continue inactive. With the three leading users of No. 1 heavy melting steel in eastern Pennsylvania asking postponement of deliveries on contracts, only a small tonnage of this grade is moving, but brokers are still paying \$14 a ton, delivered. No. 2 heavy melting steel is quiet at \$12.50 a ton, delivered to Phoenixville, Conshohocken or Pencoyd, Pa. Machine shop turnings are being shipped to Phoenixville, Pa., at \$10.75 a ton, delivered, and to Conshohocken, Pa., at \$11 a ton delivered.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$10.50 to \$11.35
Heavy melting steel (yard)	7.50 to 8.00
No. 1 hvy. breakable cast	9.75 to 10.50
Stove plate (steel works)	8.00
Locomotive grate bars	8.25
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.25 to 7.50
Cast borings (blast fur. or steel works)	7.00 to 7.50
Mixed borings and turnings	6.75 to 7.50
Steel car axles	15.25 to 16.25
Iron car axles	20.50 to 21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.25 to 9.75
Forge fire	8.50 to 9.00
No. 1 railroad wrought	11.50 to 12.50
No. 1 yard wrought, long	10.50 to 11.50
Rails for rolling	10.50 to 11.00
Stove plate (foundry)	8.25 to 8.50
Malleable cast (railroad)	12.50 to 13.00
Cast borings (chemical)	8.50 to 9.50

Prices per gross ton, deliv'd local founders:

No. 1 machry. cast	\$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

ham, or, with a rail and water freight rate to Philadelphia of \$5.25 a ton, at \$18.75, delivered. Cast iron soil pipe makers have been more active recently in the purchase of small tonnages, and a Delaware River producer of pressure pipe has closed on about 10,000 tons of foundry iron. Basic iron continues quiet, but one of the larger eastern Pennsylvania users is expected to be in the market soon.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.76 to \$21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26 to 22.26
East. Pa. No. 1X	21.72 to 22.76
Basic (del'd east. Pa.)	19.50 to 19.75
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 75c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Reinforcing Bars.—Much of the business in the market consists of projects requiring only small lots of reinforcing bars. A recent sizable award was 900 tons of billet steel bars for the second section of the Ridge Avenue subway, reported placed with the Truscon Steel Co. Competition has been severe, and billet steel reinforcing bars have occasionally been quoted to contractors at 1.82c. to 1.85c. a lb., Pittsburgh, or 2.14c. to 2.17c., delivered Philadelphia, with no extra for cutting to length. The usual quotation, however, is 1.95c., Pittsburgh, or 2.27c., delivered Philadelphia. Rail steel bar makers have been quoting about 1.85c., Franklin, Pa., and Tonawanda, N. Y., or 2.17c., delivered Philadelphia.

Shapes.—There is an increasing tonnage of fabricated steel projects in the market and mills are operating at slightly higher rates. Prices, however, are not firm, ranging from 1.80c. to 1.90c., f.o.b. nearest mill to consumer, or 1.86c. to 1.96c., delivered Philadelphia. Business in prospect includes six office, apartment and hotel buildings in Philadelphia, 8000 tons of steel in the Liberty-Linecoln building.

Philadelphia

Steel Mill Operations Slightly Improved But Prices Are Still Irregular—Building Prospects Good

PHILADELPHIA, Jan. 28.—Steel mill operations are beginning to show some improvement, but increased tonnage on mill books has not yet been sufficient to strengthen prices. Plate and bar quotations show fair stability at present levels, and shape prices have not receded further, although they lack firmness. Sheet mills are able to maintain considerably higher rates of operation than in some weeks, with one Eastern producer running practically full in its sheet department, but prices are still lacking in strength, concessions being obtainable on both blue annealed and black sheets.

Plate and shape mills are still in need of specifications for immediate execution, but some substantial prospective business is in sight from railroad car and locomotive builders, shipyards and building contractors. Two 12,000-ton vessels for a subsidiary of the Mallory Steamship Co. will require about 2000 tons each of plates. Plans have been filed in Philadelphia for two 43-story buildings, one for apartments and one for offices, a

30-story professional building, 28-story office building, 27-story manufacturing building and 26-story hotel.

Pig Iron.—Foundry iron prices are being maintained at \$20.50 a ton, furnace, with \$20 per ton occasionally quoted on desirable tonnage. Furnaces in the Buffalo district have been increasingly competitive since they began quoting \$16.50 a ton, base, and Southern pig iron is offering some competition at \$13.50 a ton, Birmingham.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier	2.70c.
Plates, $\frac{3}{8}$ -in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished $1\frac{1}{2}$ x $1\frac{1}{4}$ in.	3.50c.
Round-edge steel planished	4.30c.
Reinforce. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats	4.00c.
Steel hoops	3.55c.
Steel bands, No. 12 to $\frac{3}{4}$ -in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.90c.
*Galvanized sheets (No. 24)	4.65c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
$\frac{1}{4}$ -in.	5.30c.
$\frac{3}{8}$ -in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.

†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

12,500 tons of steel for electrification work on the Pennsylvania Railroad and about 50,000 tons of shapes in the 30 ships for new ocean mail routes, bids on which will be taken in February and March.

Plates.—Mills are still in need of tonnage, although operating rates show a slight improvement over recent weeks. Some good tonnage is in prospect from car builders, shipyards and boiler shops. Four Diesel-driven tow boats for the Erie Railroad, requiring about 2000 tons of plates, have been placed with the Pusey & Jones Co., Wilmington, Del. Plate quotations continue at 1.90c. to 1.95c., Coatesville, Pa., or 2c. to 2.05c., delivered Philadelphia.

Old Material.—All grades of scrap continue inactive, with consumers showing little interest in buying except at lower than current prices. No. 1 heavy melting steel is still quoted at \$14.50 a ton, delivered. Mills using specification pipe are offering to buy at \$13.75 a ton, delivered, a reduction of 25c. from the previous contract price, and users of cast iron carwheels have offered to buy at a 50c. a ton reduction from the former buying price of \$15.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.	\$14.50
Scrap T rails.....	14.00
No. 2 heavy melting steel.....	\$12.00 to 12.50
No. 1 railroad wrought.....	15.00 to 15.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new.....	13.00
Hydraulic compressed, old.....	12.00 to 12.50
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equiv.)	12.50 to 13.00
Cast borings (for steel works and roll. mill).....	11.00
Heavy breakable cast (for steel works)	13.50 to 14.00
Railroad grate bars.....	11.00 to 11.50
Stove plate (for steel works)	11.00 to 11.50
No. 1 low phos, hvy, 0.04% and under.....	20.50 to 21.50
Couplers and knuckles.....	19.00 to 19.50
Rolled steel wheels.....	19.00 to 19.50
No. 1 blast furnace scrap.....	10.50 to 11.00
Wrot, iron and soft steel pipes and tubes (new specific)	14.00
Shafting	19.00
Steel axles	20.00 to 21.00
No. 1 forge fire.....	13.00 to 13.50
Cast iron carwheels.....	15.00
No. 1 cast.....	15.00 to 15.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling.....	15.00 to 15.50

Sheets.—Operating rates of sheet mills have improved and one Eastern producer is running practically full in its sheet department. Consumers of sheets are actively buying small lots. Prices, however, still lack strength, especially on black sheets. Although 2.60c. a lb., Pittsburgh, or 2.92c., Philadelphia, is generally quoted on this grade, some desirable business has been taken at 2.55c., Pittsburgh, or 2.87c., Philadelphia. Blue annealed sheets are quoted at 2.25c., Pittsburgh, or 2.57c., Philadelphia, for No. 13 gage, and blue annealed plates at 2.10c., Pittsburgh, or 2.42c., Philadelphia for No. 10 gage. These prices have recently been subject to concessions of \$1 a ton on desirable specifications. Galvanized sheets are in fair demand, and prices are fairly well maintained at 3.30c. to 3.35c.,

Pittsburgh, or 3.62c. to 3.67c., Philadelphia.

Imports.—In the week ended Jan. 25, 6013 tons of chrome ore arrived at this port, of which 4466 tons was from Portuguese Africa and 1547 tons from British South Africa. Pig iron

imports consisted of 1147 tons from British India, and 25 tons of tungsten ore was received from Germany. Steel arrivals were 29 tons of structural shapes and 12 tons of steel bars from Belgium, and 14 tons of structural shapes from France.

Detroit

Ford Motor Co. Stepping Up Production—February Schedules Will Show Gains in Other Plants

DETROIT, Jan. 28.—Automobile output in February probably will average 20 per cent higher than in January, with the greatest gain by the Ford Motor Co., which has already stepped up its production to 8000 units a day.

The Ford Company will engage in the manufacture of stainless steel for use on its new models. It will install melting equipment and cold-rolling strip mills. It has sent out an inquiry for several melting furnaces for installation in its proposed stainless steel department.

The Chevrolet Motor Co. has raised its schedule from 75,000 to 96,000 cars for this month, and contemplates a heavier output in February, possibly as many as 110,000 units.

The Willys-Overland plant is producing about 550 cars a day. The Buick Company is turning out about the same number.

Pig iron shipments to automotive foundries in Michigan thus far in

January are about 90 per cent of the shipments to the same foundries in the corresponding period last year.

Buying of steel by Detroit automobile companies has been considerably heavier in the past week or two. The Ford, Chevrolet and Hudson-Essex plants are the busiest, and account for a large portion of the current steel buying.

A stronger tone is apparent in the local scrap market. Releases from steel plants have been in larger volume.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$12.50 to \$13.00
Borings and short turnings	9.25 to 9.75
Long turnings	8.50 to 9.00
No. 1 machinery cast.....	12.50 to 13.00
Automotive cast	11.50 to 12.00
Hydraul. comp. sheets.....	12.50 to 13.00
Stove plate	9.00 to 9.50
New No. 1 busheling.....	11.50 to 12.00
Old No. 1 busheling.....	9.25
Sheet clippings	8.00 to 8.50
Flashings	10.75 to 11.25

Railroad Equipment

C. & O. Buys 120 Locomotives—Milwaukee Orders 2300 Cars

RAILROAD equipment buying took a fresh spurt in the past week with the placing of 120 locomotives and 55 tenders by the Chesapeake & Ohio, Hocking Valley and Pere Marquette railroads and the ordering of 2300 cars by the Milwaukee road. The Louisville & Nashville inquired for 1800 cars and the Seaboard Air Line asked for new bids on 2000 cars instead of the 1000 on which bids were received last week. The Chesapeake & Ohio and associated roads closed bids Monday on about 11,500 freight cars, on which orders are expected within two weeks. Details of the week's business follow:

The Van Sweringen roads have purchased 20 locomotives from Lima Locomotive Works, 50 switching engines and 40 large tenders from American Locomotive Works for the Chesapeake & Ohio; 20 locomotives from Lima Locomotive Works and 15 locomotives from American Locomotive Co. for the Hocking Valley; 15 locomotives from American Locomotive Co. and 15 large tenders from Lima Locomotive Works for the Pere Marquette.

Milwaukee road has ordered 300 flat cars each from Ryan Car Co. and Pullman Car & Mfg. Corporation, 500 box cars from American Car & Foundry Co., 200 box cars from Pacific Car & Foundry Co., 500 gondola cars each from Pressed

Steel Car Co. and Bettendorf Co.; 750 stock cars remain to be placed.

Swift & Co. have ordered 300 underframes from Bettendorf Co.

New York, New Haven & Hartford has ordered 33 multi-unit trailer passenger cars from Osgood Bradley Car Co.

Great Lakes Steel Corporation, Detroit, has ordered two 70-ton, 300-hp. oil-electric switching locomotives from Westinghouse Electric & Mfg. Co.

Missouri Pacific is in the market for 20 steel caboose cars.

American Steel & Wire Co., Cleveland, has ordered one 70-ton, 400-hp. all electric locomotive for its Newburgh works from Westinghouse Electric & Mfg. Co.

Seaboard Air Line, which last week took bids on 1000 steel box cars, has asked for revised bids on 2000.

Louisville & Nashville has inquired for 1800 cars as follows: 250 70-ton mif type gondolas, 500 50-ton drop-bottom gondola cars, 300 50-ton steel hopper cars, 500 single-sheathed box cars of 50-ton capacity and 250 flat cars.

Union Oil Co. of California has ordered 60 tank cars from General American Tank Car Corporation.

Argentine State Railways have ordered 1102 box cars, 390 flat cars, 500 gondola cars and 60 box cars in England.

Central of New Jersey is inquiring for five switching engines and five Pacific type passenger locomotives.

Ohio foundries operated at 73.5 per cent of normal in December, as compared with 90 per cent in November and 78.5 per cent in December, 1928, according to monthly report of the Ohio Foundries Association.

Birmingham

Pig Iron Buying Confined Closely to Nearby Requirements —Major Steel Products Reduced \$1 a Ton

BIRMINGHAM, Jan. 28.—Pig iron bookings are following closely the actual melting requirements of consumers, and efforts to stimulate forward contracting have availed little in the district. Buying is being done quietly, and tonnages are small. Unusually cold weather is believed to have delayed the resumption of operations at several of the smaller foundries. A gain in shipments and an increase in the melt of pipe shops and radiator plants have been the two most encouraging factors during the past 10 days. District sales continue on a \$15 base. Concessions of 50c. to \$1 a ton are reported on a few round tonnages booked from outside this territory. Of the 16 active furnaces, nine are on foundry, six on basic and one on rebarizing iron, the same as last week.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy.	1.75 to 2.25	sil.	\$14.50 to \$15.00
No. 1 fdy.	2.25 to 2.75	sil.	15.00 to 15.50
Basic			14.50 to 15.00

Finished Steel.—Prices have been reduced \$1 a ton on bars, plates, shapes, black and galvanized sheets. These changes bring into effect quotations of 2c. on bars, plates and shapes, 2.90c. on black sheets and 3.50c. on galvanized sheets. Blue annealed sheets are unchanged at 2.35c. for No. 10 gage and at 2.50c. for No. 13. Bookings in the above lines this month have exceeded those for the corresponding period in December. Buying has been almost entirely for actual requirements. Mills have rounded out operating schedules during the past two weeks, and in most instances these are now on a good

basis. Another quiet week among structural steel fabricators is attributed to hesitancy of prospective buyers in placing work already figured. Active open hearths number 19 or 20 of the 23 available.

Cast Iron Pipe.—The market was quiet in the past week, owing to delays in placing tonnages on which bids had been opened. Definite inquiries before the market, together with the projects already figured, make a good total. The bulk of the demand continues to come from municipalities and utilities. Private business is confined to the larger users. Small orders are spotty and their aggregate tonnage light. Plants in the district are in a better position than in a number of weeks. Prices are unchanged, \$37 applying to carload lots or larger and \$38 for less than car lots.

Old Material.—Light or suspended operations of the smaller foundries is an important contributing factor to the almost negligible activity in cast iron grades. There is a fair demand for steel grades. Prices are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	\$12.00 to \$13.50
Scrap steel rails	14.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	11.50 to 12.00
Steel axles	22.00
Iron axles	23.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	13.50
No. 1 cast	13.00
Tramcar wheels	12.50
Cast iron carwheels	12.00 to 13.50
Cast iron borings, chem.	13.50 to 14.00

ing the week. The Pacific Coast Steel Corporation took 500 tons additional for a pulp plant at Port Angeles, Wash., 233 tons for the Lake Union bridge, Seattle, and 200 tons for a college building for the University of Washington at Seattle. The Lynch-Cannon Co., Los Angeles, was low bidder on a bridge over the Salt River near Phoenix, Ariz., calling for 900 tons. Several California State highway projects, involving upward of 500 tons, come up for figures next week. Out-of-stock prices continue at 2.30c., base, on carload lots in the San Francisco district, with 2.60c., applying on smaller lots. Quotations in Los Angeles are \$2 a ton higher. Demand for merchant bar steel continues limited to unimportant lots. On this class of material, 2.35c., c.i.f., appears to be firm.

Plates.—Bids were opened this week on 283 tons for a 22-in. riveted pipe line at Omak, Wash., requiring 3/16 and 1/4-in. plate and No. 10 and 12 gage blue annealed sheets. Prices are weak at 2.25c., c.i.f., coast ports.

Shapes.—The structural shape market was active during the week, more than 3000 tons having been placed. The McClintic-Marshall Co. took 250 tons for an apartment house on Jackson Street, San Francisco; the Consolidated Steel Corporation booked 150 tons for a bridge at Newport Beach, Cal., and the Star Iron Works secured 300 tons for a grain elevator at Tacoma. The Bethlehem Steel Co. was awarded 900 tons of sheet steel piling for the Lake Union bridge project at Seattle. Bids were opened this week on 300 tons for the Southern Pacific Hospital addition in San Francisco. Plain material remains firm at 2.35c., c.i.f.

Cast Iron Pipe.—The week's only award was 415 tons of 6-in. Class 250 Mono-cast pipe, for Vancouver, B. C., placed with Leith, Murray & Co. Bids were opened on 3618 tons of 4 to 16-in. Class B for the East Bay Municipal Utility District, Oakland. The United States Pipe & Foundry Co. was low on two schedules and the Pacific States Cast Iron Pipe Co. was low on one. The Santa Fe Irrigation District, Oceanside, Cal., opened bids on 383 tons of 12-in. Class B or steel pipe. Bids will be opened Jan. 27 on 1693 tons of 2 to 10-in. Class B pipe for the Downey County Water Works District at Downey, Cal.

Track Material.—The Oakland Port Commission, Oakland, will open bids Feb. 3 on 500 tons of track material, including 128-lb. girder rails, 90-lb. T-trails, frogs, switches, track bolts, spikes and tie plates.

Pacific Coast

Gain in Demand for Reinforcing Steel and Structural Shapes —Bridge Calls for 3500 Tons of Bars

SAN FRANCISCO, Jan. 25 (*By Air Mail*).—A slight gain in demand for steel products on the Pacific Coast is reported, reinforcing bars and structural shapes showing the greatest improvement. The outstanding award of the week went to the Wallace Bridge & Structural Steel Co. and involved 1250 tons of shapes for the Washington Athletic Club at Seattle. Important pending tonnages include 970 tons of shapes for an auditorium at Long Beach, Cal., bids on which will be opened Feb. 14, and 3500 tons of reinforcing bars for the Fourth Street bridge in Los Angeles, bids on which will be opened Jan. 29.

Pig Iron.—Demand for foundry pig iron remains quiet, sales being confined to small lots for prompt shipment. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
*Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—More than 1200 tons of reinforcing steel bars were placed dur-

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.30c.
Soft steel bars	3.30c.
Small angles, $\frac{1}{4}$ -in. and over	3.15c.
Small angles, under $\frac{1}{4}$ -in.	3.55c.
Small channels and tees, $\frac{1}{4}$ -in. to 2 $\frac{1}{4}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'd sheets (No. 10)	3.90c.
Galv. sheets (No. 24)	5.30c.
Struc. rivets, $\frac{1}{2}$ -in. and larger	5.65c.
Com. wire nails, base per keg	\$3.40
Cement c'td nails, 100 lb. keg	3.40

Fifth class rates on iron and steel waster sheets and high-finished "rejects" in carloads, from Ashland, Ky., to Michigan City, Ind., were held not to be unreasonable by the Interstate Commerce Commission in a decision made public last week in connection with a complaint made by the Cabanette Corporation, Michigan City, manufacturer of kitchen cabinet units.

St. Louis

Malleable Foundries Seek 8000 Tons of Pig Iron—Granite City Steel Co. Operating at 85 Per Cent

ST. LOUIS, Jan. 28.—With a resumption of buying by automobile manufacturers, malleable foundries catering to that industry are showing a renewed interest in pig iron. The melt is increasing, and inquiries for more than 8000 tons of malleable iron are pending, and probably will be closed this week. The weather has been too cold for satisfactory operations, and the melt has been affected. Sales of the St. Louis Gas & Coke Corporation for the week totaled about 2400 tons in widely scattered lots. Shipments for January have exceeded December's movement, but are less than in January last year.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25,	2.25
f.o.b. Granite City, Ill.	\$19.50 to \$20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd	
St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.92 to 19.42
Northern malleable, deliv'd	22.16
Northern basic, deliv'd....	22.16

Freight rates: 75c. (average) Granite City to St. Louis: \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel.—The Granite City Steel Co. will operate this week at an average of 85 per cent of capacity. The last 10 days have brought an improvement in bookings, and January promises to be better than last month, but not so good as January, 1929.

Old Material.—The market for old material continues quiet. Consumers are said to be willing enough to buy at present prices, but dealers are wary of accepting business on this basis. Below-zero weather has made it difficult to handle scrap iron, and receipts to this market are light. In some instances, consumers who have let their stocks run too low have been willing to pay a premium for material on which car numbers can be given. Railroad lists follow: Texas & Pacific, 1060 tons; Chicago & Illinois Midland Valley, 140 tons; New York, Chi-

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock.....	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets.....	4.90c.
Structural rivets.....	4.15c.
Boiler rivets.....	4.15c.
Per Cent Off List	
Tank rivets, $\frac{1}{2}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

cago & St. Louis, 22 carloads; Nashville, Chattanooga & St. Louis, 10 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel.....	\$12.50 to \$13.00
No. 2 heavy melting or shoveling steel.....	11.75 to 12.25
No. 1 locomotive tires.....	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart.....	13.50 to 14.00
Railroad springs.....	15.50 to 16.00
Bundled sheets.....	9.50 to 10.00
No. 2 railroad wrought.....	12.50 to 13.00
No. 1 busheling.....	9.75 to 10.25
Cast iron borings and shoveling turnings.....	9.25 to 9.75
Iron rails.....	13.00 to 13.50
Rails for rolling.....	14.50 to 15.00
Machine shop turnings.....	6.75 to 7.25
Heavy turnings.....	9.50 to 10.00
Steel car axles.....	19.00 to 19.50
Iron car axles.....	25.50 to 26.00
Wrot. iron bars and trans.....	21.50 to 22.00
No. 1 railroad wrought.....	13.00 to 13.50
Steel rails, less than 3 ft.....	17.00 to 17.50
Steel angle bars.....	14.00 to 14.50
Cast iron carwheels.....	14.00 to 14.50
No. 1 machinery cast.....	15.25 to 15.75
Railroad malleable.....	14.00 to 14.50
No. 1 railroad cast.....	14.00 to 14.50
Stove plate.....	11.75 to 12.25
Relay. rails 60 lb. and under.....	20.50 to 23.50
Relay. rails 70 lb. and over.....	26.50 to 29.00
Agricult. malleable.....	13.00 to 13.50

Steel Co., which lifts its schedules this week almost to 80 per cent. The company starts one blast furnace which has been banked, giving it two active furnaces at its Hasteon plant; starts its Liberty tin mill works at Leavittsburg, which has been operating intermittently for the past few months, and is operating 20 of 23 open-hearth furnaces.

The Youngstown Sheet & Tube Co. continues to maintain its district operation at 65 per cent; Carnegie Steel Co. at 65 to 70 per cent; Sharon Steel Hoop Co., 75 per cent, and Newton Steel Co., 80 per cent.

Of 51 independent open-hearth furnaces, 38 are active, against 35 recently and a low of 15 late in the fourth quarter. Strip and tin mills are averaging 75 per cent. Of 120 sheet mills in the Mahoning Valley,

74 are scheduled. Bar mill operations average 65 per cent, and pipe mills are maintaining 55 per cent.

Canada

Railroad Business Aids Dominion's Industries

TORONTO, ONT., Jan. 28.—Taking into consideration booked orders and prospective business for early placing, the iron and steel industry of Canada is now assured of almost capacity operations for several months. Orders placed for rails by the Canadian National Railways, augmented by orders from the New York Central and the Newfoundland Government, will keep the mills at Sydney, N. S., and Sault Ste. Marie, Ont., the only rail mills in Canada, running at full time for the next six months, and it is intimated that the Canadian Pacific is about to enter the market for substantial tonnages. Car and locomotive plants have been well taken care of by Canadian National orders, with other business in prospect. The Canadian Pacific Railway will place orders in the immediate future for approximately \$15,000,000 worth of rolling stock.

In addition to the railroad orders, miscellaneous business is developing on a more substantial scale, with the result that foundries have increased their melt and radiator makers are becoming more active.

Pig Iron.—While the demand for merchant iron has been showing steady improvement since the first of the year, business as a whole is still somewhat backward. Forward delivery contracts already placed amount to 15,000 to 20,000 tons, and, while other business is expected, melters are withholding contracts in the expectation that a readjustment of prices may be made at an early date.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$23.60
No. 2 fdy., sil. 1.75 to 2.25.....	23.10
Malleable	23.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$25.00
No. 2 fdy., sil. 1.75 to 2.25.....	24.50
Malleable	25.00
Basic	23.50

Imported Iron, Montreal Warehouse

Summerlee	\$23.50
Carron	23.00

Structural Steel.—Large improvement in demand for structural steel is looked for within the next month or six weeks. While contracts closed recently have been confined to lots up to 500 tons, contracts involving up to 5000 tons will develop in the early future according to building programs already announced. Inquiries are out for a total of about 10,000 tons.

Old Material.—Listless interest is holding the demand for iron and steel scrap to a minimum in both Toronto

Youngstown

Valley Mills Operating on Better Schedules

YOUNGSTOWN, Jan. 28.—January has brought a substantial comeback in operating activities of the Valley iron and steel industry. Fresh demands from the automobile industry, chiefly from the Ford Motor Co., are among the principal factors in this betterment, which has resulted in re-employment of hundreds of mill workers.

The February record, steel makers believe, should be one of progressive improvement, though on a more moderate scale.

"Business is good and looks promising," is the comment of E. T. McCleary, president, Republic Iron &

and Montreal markets. Consumers are taking in supplies in small tonnages for immediate consumption, but very few are placing forward contracts.

Dealers' buying prices:

	<i>Per Gross Ton</i>	
	Toronto	Montreal
Heavy melting steel	\$10.00	\$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel borings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axes, wrought iron	15.00	22.00
No. 1 machinery cast	17.00	17.00
Stove plate	13.00	13.00
Standard carwheels	16.00	16.00
Malleable	13.00	13.00
	<i>Per Net Ton</i>	
No. 1 mach'ry cast	\$16.00	...
Stove plate	12.00	...
Standard carwheels	15.00	...
Malleable scrap	14.00	...

Buffalo

Foundry Pig Iron Melt Gains Slightly

BUFFALO, Jan. 28.—No sizable pig iron inquiries have appeared, but there has been a good volume of small business aggregating about 7000 tons. The foundry melt is slightly improved. One of the larger orders was for 500 tons of foundry, and another was for 400 to 500 tons. The base price of \$18.50 in the district is firm, but it has not attracted the bookings that were expected. In the East, the price is around \$17, base Buffalo, with reports of some shading of this figure.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$18.50
No. 2X fdy., sil. 2.25 to 2.75	19.00
No. 1 fdy., sil. 2.75 to 3.25	20.00
Malleable, sil. up to 2.25	19.00
Basic	17.00
Lake Superior charcoal	27.28

Finished Steel.—Operations of local mills continue to see-saw, with a slight tendency toward increases. The Lackawanna plant of the Bethlehem Steel Co. is operating 15 of its 22 open-hearths as against 16 last week. The Donner Steel Co. operation is still three open-hearths, though the expectation is that this will be increased this week. The Wickwire-Spencer operation is two open-hearths out of four. The Seneca Iron & Steel Co.'s operation shows the effect of an improvement in automobile sheet demand, with the percentage between 70 and 72.

Old Material.—A few sales of stove plate have been made at \$12.75 and

Warehouse Prices, f.o.b. Buffalo

	<i>Base per Lb.</i>
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per kg.	\$2.35
Black wire, base per 100 lb.	3.45

some machinery cast scrap has been sold at \$13.50. However, the grade of machinery cast involved was not strictly No. 1 and for that reason was purchased at a slight concession. A sale of No. 2 heavy melting steel was made at \$12.50. There has been some activity in machine shop turnings, with sales at \$11 to \$11.25, delivered, Niagara Falls. However, the principal Buffalo consumer of this material will not pay more than \$8. A few sales of locomotive grate bars have been made at \$11, and some steel rails, 3 ft. and under, at \$18. Some sales of cast iron car wheels have been made at \$12.00 to \$12.50.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$14.00 to \$14.50
No. 2 heavy melting scrap	12.50
Scrap rails	14.50
Hydraul. comp. sheets	12.50
Hand bundled sheets	10.50 to 11.00
Drop forge flashings	12.50
No. 1 busheling	13.50
Hvy. steel axle turnings	13.50 to 14.00
Machine shop turnings	8.50 to 9.50
No. 1 railroad wrought	11.00 to 11.50

Acid Open-Hearth Grades:	
Knuckles and couplers	18.00 to 18.50
Coil and leaf springs	18.00 to 18.50
Rolled steel wheels	18.00 to 18.50
Low phos. billet and bloom ends	18.00 to 18.50

Electric Furnace Grades:	
Short shov. steel turnings	12.50 to 13.00

Blast Furnace Grades:	
Short mixed borings and turnings	10.75 to 11.25
Cast iron borings	10.75 to 11.25
No. 2 busheling	8.00

Rolling Mill Grades:	
Steel car axles	17.00 to 17.50
Iron axles	20.00 to 21.00

Cupola Grades:	
No. 1 machinery cast	14.50 to 15.00
Stove plate	12.50 to 12.75
Locomotive grate bars	10.50 to 11.00
Steel rails, 3 ft. and under	18.00 to 18.50
Cast iron carwheels	12.00 to 12.50

Malleable Grades:	
Industrial	16.50 to 17.00
Railroad	16.50 to 17.00
Agricultural	16.50 to 17.00

Special Grades:	
Chemical borings	12.00 to 12.50

Warehouse Prices, f.o.b. Boston

	<i>Base per Lb.</i>
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

Per Cent Off List

Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Boston

Pig Iron Sold Into Second Quarter

BOSTON, Jan. 28.—Pig iron sales the past week fell short of 5000 tons, with 3000 tons sold by one furnace. Sales included one lot of 1000 tons, two of 500 tons and one of 600 tons, the latter to a paper machinery manufacturer for second quarter delivery. Some of the iron was sold at delivered prices equivalent to less than \$17 a ton, base Buffalo. Buffalo stacks are holding to \$17 a ton, furnace, for No. 2 plain and No. 2X and are not securing much business. Imported iron is quiet, and generally is quoted at \$21.75 a ton on dock here, duty paid, for No. 2X.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25.	..\$21.91 to \$22.41
*Buffalo, sil. 2.25 to 2.75.	21.91 to 22.41
East. Penn., sil. 1.75 to 2.25.	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75.	23.15 to 23.65
Va., sil. 1.75 to 2.25.	25.21
Va., sil. 2.25 to 2.75.	25.71
*Ala., sil. 1.75 to 2.25.	24.11
*Ala., sil. 2.25 to 2.75.	24.61
*Ala., sil. 1.75 to 2.25.	20.25
*Ala., sil. 2.25 to 2.75.	20.75

Freight rates: \$4.91 all rail from Buffalo; \$3.65 all rail from eastern Pennsylvania; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

+Rail and water rate.

Castings.—Low prices are being made on castings required by municipalities. Boston the past week bought 605 tons of castings, including 175 tons of gates and hydrants from the International Merchandising & Trading Co., Boston, at 4.50c. a lb.; 125 tons of branches, curves, etc., from E. L. LeBaron Foundry Co., Boston, at 4.67c.; 150 tons of two part boxes from the Alabama Pipe Co., Anniston, Ala., at 3.04c.; 100 tons of service pipe from E. L. LeBaron Foundry Co. at 4.45c.; 30 tons of frames and covers from the same foundry at 2.35c.; and 25 tons of 9 x 9 in. flange frames at 2.74c. Providence, R. I., closes bids Feb. 3 on special castings for its water and sewer departments.

Cast Iron Pipe.—Bids opened Jan. 27 by Boston for 2100 tons of 6, 8, 12 and 24-in. pipe disclosed that prices are not so strong as appeared on the surface and that the French manufacturer is still a factor in the domestic market. Herbert Kennedy Co., Inc., representing the French interest, was the low bidder at \$38.50 a ton, that price being \$2 to \$2.25 a ton under those submitted by domestic foundries, and \$3.60 to \$4.60 a ton under prices heretofore quoted openly by domestic foundries. Domestic foundries cut their prices \$1.55 to \$2.60 a ton. R. D. Wood & Co. bid \$40.50 a ton, the Warren Foundry & Pipe Co., \$40.55, and the United States Pipe & Foundry Co., \$40.75. R. D. Wood & Co. and the French interest each bid \$110 for 10 tons of special

24 to 48-in. castings; the Warren Foundry & Pipe Co., \$119; and the United States Pipe & Foundry Co., \$130. For 50 tons of 4-in. pipe in 6-ft. lengths, also to be bought by Boston, the Alabama Pipe Co. bid \$68.25; the Warren Foundry & Pipe Co., \$74.80; the United States Pipe & Foundry Co., \$75. The Consolidated Gas Co., Boston, is reported to have divided 4500 tons of 6 to 16-in. pipe between the United States Pipe & Foundry Co. and R. D. Wood & Co., while another utility is said to have placed 1000 tons with the Warren Foundry & Pipe Co. In addition, 1000 tons has been placed privately by a Massachusetts municipality, as well as two miles of 16-in., and Providence, R. I., has bought 1500 lengths of 12-in. pipe from the United States Pipe & Foundry Co. at \$40.85. Cumberland, R. I., contemplates the purchase of 6200 ft. of 6-in. pipe and 7300 ft. of 4-in., together with valves and hydrants.

Fabricated Steel.—Only one sizable job was let during the past week, 2700 tons for a telephone exchange in Boston to the New England Structural Co. One New England fabricator is booked into the second quarter, but the others are not so well off.

Old Material.—On new orders, heavy melting steel is moving at \$10.25 to \$10.50 a ton, on cars shipping point, and on old orders at \$10.80 generally. Thus, the market for such material is a little easier. Current sales of steel turnings are largely at \$6 to \$6.25, and steel mill borings at \$6.25 to \$6.35. One sale of forge flashings was made the past week at \$9.25 a ton, but most of the business was within the range of \$8.50 to \$9. No sale of mixed borings and turnings was reported at less than \$6, whereas heretofore \$5.75 was done. Skeleton prices are a shade firmer. The general scrap market is quieter, with prices showing less strength.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

Nc. 1 heavy melting steel.	\$10.25 to \$10.80
Scrap T rails.....	10.00 to 10.25
Scrap girder rails.....	9.00 to 9.50
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	9.50 to 10.00
Machine shop turnings.....	6.00 to 6.50

Cast iron borings (steel works and rolling mill).	6.00 to 6.50
Bundled skeleton, long....	8.50 to 9.00
Forge flashings.....	8.50 to 9.00
Blast furnace borings and turnings.....	6.00 to 6.25
Forge scrap.....	8.00 to 8.50
Shafting.....	14.00 to 14.50
Steel car axles.....	15.50 to 16.50

Wrought pipe 1 in. in diameter (over 2 ft. long)	9.00 to 9.50
Rails for rolling.....	10.50 to 11.00

Cast iron borings, chemical.....	9.00 to 9.50
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Prices per gross ton deliv'd consumers' yards:

Textile cast.....	\$14.00 to \$14.50
No. 1 machinery cast.....	15.00 to 15.25
No. 2 machinery cast.....	14.00 to 14.50
Stove plate.....	10.00 to 11.00
Railroad malleable.....	17.00 to 17.50

Westinghouse Electric & Mfg. Co. will spend about \$10,000,000 in 1930 for plant improvement and doubling its research activities, according to an announcement made in St. Louis by Andrew W. Robertson of Pittsburgh, chairman of the board.

Cincinnati

Pig Iron Weaker, with Sales of Southern at \$13 to \$14.50, Furnace—Sheet Demand Gains

CINCINNATI, Jan. 28.—Although there has been little or no inquiry for pig iron during the last two weeks, district consumers last week hurriedly covered for their first quarter requirements, ordering approximately 6000 tons of iron. Buyers are not inquiring generally, but are taking material after requesting quotations from selected sources. Of the sales last week, 2250 tons went to Southern furnaces at prices which figure back to about \$13 to \$14.50, base Birmingham. In fact, Southern iron lapsed into a weaker position than at any time in the last two months. While most of the furnaces have been quoting \$14 to \$14.50, base Birmingham, concessions of from 50c. to \$1.50 in certain instances have forced other furnaces to bid closely on substantial orders. As a result, a small tonnage was placed last week, at \$13, base Birmingham, while the remainder of the Southern iron was sold at \$14 and \$14.50, with \$14 the most frequent price. A feeling of uncertainty among Northern furnaces over price schedules, combined with desire to sell a substantial amount of iron is contributing an undertone of weakness to Northern prices, although no definite announcement of a change has been made. Two central Indiana consumers took 250 tons and 300 tons of Southern foundry iron respectively and a third melter in the same area bought 200 tons of Northern foundry iron. A Northern furnace sold 150 tons of foundry iron in Dayton, Ohio, 237 tons at Portsmouth, Ohio, 500 tons in northern Ohio, and 500 tons in Zanesville, Ohio. There are no sizable inquiries before the trade.

Prices per gross ton, deliv'd Cincinnati:

No. Ohio fdy., sil. 1.75 to 2.25	\$19.89 to \$20.39
Ala. fdy., sil. 1.75 to 2.25	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinfrc. bars.....	3.15c.
Rail steel reinfrc. bars.....	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex. Squares	3.85c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg.....	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain, per 100 lb.....	10.25

Net per 100 Ft.

Lap-welded steel boiler tubes, 2-in.	\$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

Finished Steel.—Orders for sheets, particularly from two of the leading makers of low-priced automobiles, have gained considerably during the past week. The leading sheet manufacturer of this district is now operating its mills at full capacity. Automobile sheets, which recently settled to 3.90c. a lb., Pittsburgh, are being held firmly at that price, it is said here.

Old Material.—Although the mills are taking scrap on old contracts, the absence of substantial new business is giving the market an undertone of weakness. Dealers are bidding 25c. less on heavy melting steel and No. 2 wrought than a week ago. While the supply of good steel scrap is a trifle easier, dealers say that yard accumulations are chiefly in the cast iron grades.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$12.25 to \$12.75
Scrap rails for melting.....	13.00 to 13.50
Loose sheet clippings.....	8.00 to 8.50
Bundled sheets	10.75 to 11.25
Cast iron borings.....	8.50 to 9.00
Machine shop turnings.....	8.25 to 8.75
No. 1 busheling.....	10.00 to 10.50
No. 2 busheling.....	6.50 to 7.00
Rails for rolling.....	13.50 to 14.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	12.50 to 13.00
Short rails	17.50 to 18.00
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	18.50 to 19.00
No. 1 railroad cast.....	15.00 to 15.50
Burnt cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Brake shoes	10.00 to 10.50
Agricultural malleable	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Steam Roads Have 4300 Track Miles Electrified

Eighteen railroads in the United States which formerly operated by steam only, now operate electrically on about 4300 miles of track, according to a survey of railroad electrification just completed by the Copper and Brass Research Association.

This electrification represents about 1900 miles of route, and of the 4300 miles of track approximately 3150 miles are main line track. In this electrified territory the railroads have in service 465 electric locomotives and 2750 multiple-unit cars for passenger service. Of these cars 2150 are motor cars and the rest are trailers.

Bethlehem Gets Ship Award

WASHINGTON, Jan. 28.—The Bethlehem Shipbuilding Corporation, Ltd., will build at its Fore River, Mass., yard a 4500-ton combination passenger-cargo vessel for the Coamo Steamship Corporation of New York, which has just been granted a construction loan of \$1,896,000 by the Shipping Board.

Fabricated Structural Steel

Awards in Week Total 53,000 Tons—New York Subways Swell New Inquiry to 44,000 Tons

AWARDS of structural steel reached a total of more than 53,000 tons in the past week, the largest this year and comparing favorably with the active weeks of last year. The previous week's total was 25,000 tons. More than half of the week's business was in three projects, the Emery Estate buildings in Cincinnati, 16,000 tons, and two office buildings in New York, one of 7000 and the other of 8000 tons. New projects were considerably in excess of previous weeks with a total of more than 44,000 tons, compared with 10,500 tons in the previous week. Of this total, 18,000 tons is for New York City subways and 8000 tons for an office building in Philadelphia.

BOSTON, 2700 tons, telephone exchange, to New England Structural Co.

INWOOD, VT., 160 tons, transformer service unit, to Palmer Steel Co.

STATE OF CONNECTICUT, 200 tons, highway bridge, to American Bridge Co.

NEW YORK, 7000 tons, office building at Seventh Avenue and Thirty-fourth Street, to Levering & Garrigues Co.

NEW YORK, 8000 tons, office building at Broadway and Thirty-eighth Street, to Harris Structural Steel Co.

NEW YORK, 1500 tons, apartment building on Beckman Place, to Hay Foundry & Iron Works.

NEW YORK, 550 tons, Polyclinic Hospital addition, to Harris Structural Steel Co.

NEW YORK, 1000 tons, apartment building, West Seventy-ninth Street near Amsterdam Avenue, to Hay Foundry & Iron Works.

BALTIMORE, 1500 tons, Baltimore Life Insurance Building, to McClintic-Marshall Co.

STATE OF NEW JERSEY, 212 tons, highway bridge at Maple Shade, to Phoenix Bridge Co.

PITTSBURGH, 750 tons, five barges for J. K. Davison & Brothers, to Riter-Conley works, McClintic-Marshall Co.

LOUISVILLE, KY., 850 tons, addition for Henry Vogt Machine Co., to McClintic-Marshall Co.

ATLANTA, GA., 1010 tons, Henly Building, to Virginia Bridge & Iron Co.

CANTON, OHIO, 450 tons, store for Halle Brothers Co., to Hiner Structural Steel Co.

CINCINNATI, 16,000 tons, Emery Estate buildings, to American Bridge Co.

MINNEAPOLIS, 300 tons, lock gates for Twin City locks, to Independent Bridge Co.

CLINTON COUNTY, IOWA, 150 tons, bridges, to Clinton Bridge & Iron Co.

CHICAGO, ROCK ISLAND & PACIFIC, 320 tons, truss spans, to American Bridge Co.

LOUISVILLE, NEB., 750 tons, bridge, to Omaha Steel Works.

MEXICO, 560 tons, building for Cananea Copper Co., to Kansas City Structural Steel Co.

SAN DIEGO, CAL., 5200 tons plates, welded steel pipe line, recently reported as 250 tons, to Western Pipe & Steel Co.

SAN FRANCISCO, 250 tons, apartment building, Jackson and Gough Streets, to McClintic-Marshall Co.

SEATTLE, 900 tons sheet steel piling, Lake Union bridge, to Bethlehem Steel Co.

SEATTLE, 1250 tons, Washington Athletic Club, to Wallace Bridge & Structural Steel Co.

SEATTLE, 100 tons, warehouse for Texas Corporation, to Isaacson Iron Works.

TACOMA, WASH., 300 tons, grain elevator, to Star Iron Works.

MEDICAL LAKE, WASH., 100 tons, State hospital, to Isaacson Iron Works.

PHILADELPHIA, 125 tons, Cayuga Street bridge for city; bids open Jan. 29.

BOSTON & MAINE RAILROAD, 300 tons, three bridges.

MONTREAL, 1000 tons, Robert Simpson store.

VERDUN, QUE., 400 tons, hospital.

CHATHAM, ONT., 350 tons, building for Collegiate Institute.

NEW YORK, 400 tons, public school No. 138 in Queens.

NEW YORK, 18,000 tons, subways, section 4, route 103, 10,500 tons and section 4, route 110, 7500 tons.

STATE OF NEW YORK, 600 tons, highway bridge.

ATLANTA, GA., 1500 tons, First National Bank Building.

TOLEDO, PEORIA & WESTERN, 500 tons, bridges.

CLEVELAND, 300 tons, service building for Western Reserve University.

DETROIT, 3800 tons, grade crossing elimination work for Grand Trunk Railroad.

DETROIT, 500 tons, building for Michigan Bell Telephone Co.

DES MOINES, IOWA, 2400 tons, Burton Building.

SPRINGFIELD, ILL., 1700 tons, building for Central Illinois Public Service Co.

WICHITA, KAN., 1200 tons, Roosevelt Hotel.

BIG FOUR RAILROAD, 400 tons, bridge at St. Louis.

CALGARY, ALTA., 300 tons, hotel for R. C. Thomas.

LONG BEACH, CAL., 970 tons, municipal auditorium; bids Feb. 14.

SAN FRANCISCO, 300 tons, Southern Pacific Hospital addition; bids opened.

SAN DIEGO, CAL., 350 tons, erection shop for United States Navy, Bureau of Yards and Docks.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

BIG FOUR RAILROAD, 400 tons, bridge work at Indianapolis.

PHILADELPHIA, 8000 tons, Liberty-Lincoln Building, Broad and Chestnut Streets.

PHILADELPHIA, 600 tons, second opening of bids by city on Olney Avenue Bridge Feb. 5.

Reinforcing Steel

Awards at 6300 Tons Show Increase—Inquiries Total 6000 Tons

LETTINGS of reinforcing steel reported the past week amount to 6300 tons and include 2300 tons for a sewer for the St. Louis Board of Public Service and more than 800 tons for bridges. New work totals 6000 tons, the largest job calling for 2500 tons for a bridge at Los Angeles. Awards follow:

PHILADELPHIA, 900 tons, second section of Ridge Avenue subway, reported to Truscon Steel Co.

JERSEY CITY, 250 tons, bridge over Hackensack River, route 10, sections A and B, to Kalman Steel Co.

NEW YORK, 170 tons, Sixtieth Street terminal for New York Central Railroad, to Truscon Steel Co.

LONG ISLAND CITY, N. Y., 500 tons, addition to R. H. Macy Co. warehouse, to Concrete Steel Co.

NYACK, N. Y., 100 tons, railroad grade crossing, to Truscon Steel Co.

CHICAGO, 850 tons, garage and hotel at Wabash Avenue and Harrison Street, to an unnamed bidder.

ST. LOUIS, 2300 tons, River Des Peres sewer, to Kalman Steel Co.; Scullin Steel Co. to roll bars.

GOLD BEACH, ORE., 338 tons, bridge over Rogue River; general contract to Mercer-Fraser Co., Eureka, Cal.; reinforcing steel to unnamed interest.

SEATTLE, 233 tons, Lake Union bridge, to Pacific Coast Steel Corporation.

SEATTLE, 200 tons, laboratory for University of Washington, to Pacific Coast Steel Corporation.

PORT ANGELES, WASH., 500 tons additional for pulp plant, Olympic Forest Products Co., to Pacific Coast Steel Corporation.

SEATTLE, 250 tons, James Monroe School, to Northwest Steel Rolling Mills; recently reported to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

DAYTON, OHIO, 1200 tons, track elevation work, Dayton Union Railway Terminals.

MARION, IND., 100 tons, Veterans' Hospital.

PANA, ILL., 250 tons, State building.

PHOENIX, ARIZ., 900 tons, bridge over Salt River; bids opened.

LOS ANGELES, 3500 tons, Fourth Street bridge; bids Jan. 29.

Foundries Most Active in Eastern States

Gray iron foundries operated at 86.2 per cent of normal production during December, according to figures compiled by the Gray Iron Institute, Cleveland, from reports received from 124 foundries. November operation was on the basis of 99.1 per cent of normal. The reports indicated that the greatest activity was in the district composed of the New England States, New York, New Jersey and Canada, and that the small foundries operated better than the larger plants.

Of 102 foundries reporting on business outlook, 11 said that it is good; 58, fair; 30, poor; and three, bad.

Non-Ferrous Metal Markets

Copper More Active—Tin Dull and Higher—Lead Unchanged—Zinc Stronger

NEW YORK, Jan. 28.

Copper.—Demand from foreign consumers in the past week has been quite large. Sales yesterday were close to 2000 tons and at least 750 tons was booked on Saturday. The total for the month will approximate 30,000 to 35,000 tons, which is considerably larger than in December. Domestic consumers continue to buy only from hand to mouth, and total bookings for the week have been relatively small, although there has been a fair business done each day, all for early delivery. While no definite announcement has been made, reports are general that further curtailment of output at the mines has been inaugurated by several companies. Prices continue firm, and there are still no indications of a change. The feeling persists that there will be none, in view of the fact that values have been maintained in the last two months when buying has been at low ebb. Electrolytic copper is quoted at 18c., delivered in the Connecticut Valley, for the first quarter, and the price of Copper Exporters, Inc., is 18.30c., c.i.f., usual European ports.

Tin.—After a week of quite active buying, the market has turned very quiet and prices have advanced from the low point of last week. Because of the advance, consumers have ceased buying to any extent and sellers are not exerting pressure. Prices in London today are about £4 per ton higher than a week ago, with spot standard quoted at £176 7s. 6d., future standard at £179 10s. and spot Straits at £178 2s. 6d. The Singapore price today was £180. Warehouse stocks in London are now 13,816 tons, which is a high total, and it is expected that, because of this, there will be an increase in the world's visible supply as of Jan. 31. The market here today was quiet because of advancing prices. Spot Straits tin was quoted at 39.37½c., New York.

Lead.—Consumers have booked some business for March and have made inquiries for March lead, as well as for part of their April needs. Producers are not keen in booking March delivery and particularly April metal, and, if orders were taken, a premium would probably be charged. Present business, which is not large, is confined to nearby metal and prices continue very firm, at 6.10c., St. Louis. The quotation of the leading

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Jan. 28	Jan. 27	Jan. 25	Jan. 24	Jan. 23	Jan. 22
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*.....	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	39.37½	38.62½	....	38.25	38.37½	38.25
Zinc, East St. Louis.....	5.30	5.25	5.25	5.20	5.20	5.20
Zinc, New York.....	5.65	5.60	5.60	5.55	5.55	5.55
Lead, St. Louis.....	6.10	6.10	6.10	6.10	6.10	6.10
Lead, New York.....	6.25	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price 1c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—

High brass.....	23.25c.
Copper, hot rolled.....	26.75c.
Zinc	10.50c.
Lead (full sheets).....	10.00c.

Seamless Tubes—

High brass.....	28.25c.
Copper	29.25c.

Rods—

High brass	21.25c.
Naval brass.....	24.00c.

Wire—

Copper	19.87½c.
High brass.....	23.75c.

Copper in Rolls.....

Brazed Brass Tubing.....	30.87½c.
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Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—

	Base per Lb.
High brass.....	23.25c.
Copper, hot rolled.....	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	10.30c.

Seamless Tubes—

Brass	28.25c.
Copper	29.25c.
Brass Rods.....	21.25c.

Brazed Brass Tubes.....

31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes.....	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	30.00c. to 31.00c.
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brass Rods.....	18.87½c. to 19.87½c.
Brazed Brass Tubes.....	29.12½c. to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	10.75c. to 11.25c.
Zinc sheets, open.....	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	40.00c. to 41.00c.
Tin, bar	42.00c. to 43.00c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	6.50c. to 7.50c.
Lead, American pig	7.00c. to 7.50c.
Lead, bar	9.00c. to 9.50c.
Antimony, Asiatic	10.50c. to 11.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. Ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ¼	26.75c. to 27.75c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	43.50c.
Tin, bar	45.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig	7.00c. to 7.20c.
Lead, bar	9.25c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	18.00c.
Solder, ½ and ¼	46.50c.
	28.25c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.
Copper, hvy. and wire	14.50c.
Copper, light and bottoms	12.50c.
Brass, heavy	8.00c.
Brass, light	6.75c.
Hvy. machine composition	11.25c.
No. 1 yel. brass turnings	9.00c.
No. 1 red brass or compos. turnings	10.50c.
Lead, heavy	4.75c.
Lead, tea	3.75c.
Zinc	3.00c.
Sheet aluminum	11.00c.
Cast aluminum	10.00c.
	12.00c.

interest is 6.25c., New York, as the contract price.

Zinc.—Prices of prime Western slab zinc continue to advance, and only a very little metal, if any, is available, at 5.25c., East St. Louis, practically all producers asking 5.30c. Inquiry continues good and considerable business is still being booked for the first quarter, with some April metal also included. Consumers are inquiring for second quarter delivery, but producers are reluctant to book that far ahead, although in some cases a little May metal has been contracted for. Quotations are firm at 5.30c., East St. Louis, or 5.65c., New York. The ore position is exceedingly tight. Severe weather in the Joplin district has intensified voluntary curtailment and production last week was at a low record of about 2400 tons. Total sales were only about 2100 tons, for which \$35 was paid, which is the prevailing quotation. With the total surplus down to about 32,000 tons, it is stated that at least 30,000 of this is not for sale below \$38 to \$40, Joplin.

Antimony.—Some good consuming business has been booked and the market has stiffened. Chinese metal for spot and February delivery is higher at 8.87½c., New York, duty paid. The spread between spot and futures is still large, the latter being quoted at 8.25c., duty paid.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is obtainable at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO. Jan. 28.—This market is more active in sales and shipments and prices are unchanged. Quotations on tin, after dropping one cent early in the week, recovered. The old metal market is moderately active.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 39.37½c.; lead, 6.20c.; zinc, 5.25c.; in less-than-carload lots, antimony, 10c. On old metals we quote copper wire crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Central Alloy Completes Normalizing Furnace

The Central Alloy Steel Corporation, Massillon, Ohio, has placed in operation at its Canton, Ohio, plant a new normalizing furnace that was especially designed by the company's engineers, which, it is stated, is producing unusual results in the heat treatment of special steels. It is stated that this furnace permits uniform annealing of sheets and accurate control of grain structure and that heating operations formerly requiring 44 hr., are now completed in 15 min.

Annual Foundry Conference at Wisconsin University

The fourth annual foundry conference of the department of mining and metallurgy of the University of Wisconsin will be held at the university in Madison, Wis., Feb. 4 to 6. As usual, the round table methods of presenting foundry problems and seeking their solution will be adopted. Each group will be headed by a leader in his field.

The first session will be held Tuesday afternoon, Feb. 4, at which C. R. Messenger, president, Chain Belt Co.; L. R. Clauson, president, J. I. Case Co.; Francis B. Foley, metallurgist, Midvale Steel Co., and D. G. Anderson, foundry development engineer, Western Electric Co., will address the group on subjects of general interest to foundrymen.

At the morning and afternoon sessions, Feb. 5 and 6, the schedule of subjects of the round table discussions and their leaders are as follows:

Cupola Practice—C. J. Scullin, Tucker Laboratories; Thomas G. Stewart, foundry superintendent, J. I. Case Co.

Sand Conditioning—Harry W. Dietert, United States Radiator Corporation, Detroit.

Foundry Practice—E. M. Handley, foundry superintendent, Chain Belt Co., Milwaukee; William P. Bradley, foundry superintendent, National Steel Foundries, Milwaukee.

Steel Castings—B. Aamodt, Milwaukee Steel Foundry Co., Milwaukee; J. C. Schweitzer, Slyver Steel Casting Co., Milwaukee.

Malleable Iron—P. C. De Bruyne, superintendent Moline Malleable Iron Co., St. Charles, Ill.; Dr. Anson Hayes, manager of research, American Rolling Mill Co., Middletown, Ohio.

High-Test Iron—Dr. Fritz Meyer, metallurgist, National Radiator Co., Johnstown, Pa.

Heat Treatment of Steel—F. Kubosch, metallurgist, Thurner Heat Treating Co., Milwaukee; J. R. Houston, metallurgist, Hirschfeger Corporation, Milwaukee.

Foundry Management—H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y.

Apprentice Training—C. J. Freund, Supervisor of Apprentices, Falk Co., Milwaukee.

Automotive Engineers Elect Officers

The recent annual election of officers of the Society of Automotive Engineers for 1930 resulted in the selection of Edward P. Warner, editor of *Aviation*, New York, and formerly assistant secretary of the Navy for aeronautics, for president.

Vice-presidents are: Chance M. Vought, Chance Vought Corporation, New York, representing aircraft engineering; Bruce G. Leighton, director of sales and service, Wright Aeronautical Corporation, Paterson, N. J., representing aircraft engine engineering; O. D. Treiber, president, Treiber Diesel Engine Corporation, Camden, N. J., representing Diesel engine engineering, and Arthur J. Scaife, consulting field engineer, White Motor

Co., Cleveland, representing motor truck engineering. Also George L. McCain, research engineer, Chrysler Corporation, Detroit, representing passenger car engineering; John Younger, professor of industrial engineering, Ohio State University, Columbus, representing production engineering; and F. C. Horner, assistant to the vice-president, General Motors Corporation, New York, representing transportation and maintenance.

Members elected to the Council, to serve for two years, are: Ralph R. Teetor, engineer, Perfect Circle Co., Hagerstown, Ind.; F. K. Glynn, engineer in charge of operation and maintenance of automotive equipment, American Telephone & Telegraph Company, New York, and A. W. S. Herrington, general manager, Coleman Motors Corporation, Washington.

C. B. Whittelsey, Jr., is treasurer.

The society will celebrate its quarter-century anniversary this summer. Its roster now includes more than 7000 automotive engineers and executives.

The annual meeting of the society, held at the Book-Cadillac Hotel, Detroit, last week comprises some 17 sessions, for which a large number of papers have been prepared for discussion. In addition to a Diesel engine session and a transportation conference, a body conference will be held on Thursday, Jan. 23. Papers include "Sheet Metal and Its Fabrication for Automobile Bodies," by Dr. G. L. Kelley, Edward G. Budd Mfg. Co., Philadelphia, and "European All-Metal Body Construction," by T. L. Hibbard, Hibbard & Darrin. At the inventions session, Jan. 24, W. J. Davidson, General Motors Corporation, will speak on "The Work of the New Devices Committee of the General Motors Corporation."

To Honor Industrialists with Gold Medals

Industrialists as well as men in the shops and factories will be given public recognition for outstanding achievements in industry under a plan formulated by the officials of MacDonald Brothers Engineering Laboratories, Inc., of Massachusetts, a company formed to erect and operate a year-round permanent exposition of industrial tools and equipment at Detroit.

The men who make the most outstanding contributions to industry each year will be awarded gold medals and substantial cash prizes by the MacDonald Brothers organization. A committee composed of American industrialists will determine the conditions of the awards. H. E. MacDonald, vice-president and general manager of the laboratory organization, says the committee on awards will be appointed this year before the completion of the laboratory building in Detroit.

PERSONAL

FRANKLIN B. RICHARDS, for many years nationally prominent in the pig iron and iron ore industries, is retiring from active participation in business. He has resigned as director of the M. A. Hanna Co., Cleveland, but will continue as a director of the Hanna Furnace Co. Colonel Richards



F. B. RICHARDS

CHARLES H. MORSE, chairman of the board of directors of Fairbanks, Morse & Co., whose principal plant is at Beloit, Wis., has given \$100,000 to Beloit College, of which he has been a trustee for the last 25 years, for the building and equipment of a recitation hall.

W. W. LEWIS, formerly technical director of Armeo International Corporation, Middletown, Ohio, has been appointed assistant to W. W. SERALD, vice-president in charge of general commercial activities and developments for the American Rolling Mill Co. Mr. Lewis joined the company in 1917 as assistant open-hearth superintendent at Middletown and was successively superintendent of steel works at the Ashland plant, member of the export department, and manager of the branch office in London, and technical director. He is at present abroad but plans to return about Feb. 15 to take up his new duties.

C. E. STINE, of the Detroit office of the Reliance Electric & Engineering Co., Cleveland, has been placed in charge of the newly-established Toledo, Ohio, office of the company.

A. L. MEYER, assistant manager of sales, Alan Wood Steel Co., Ivy Rock, Pa., has been appointed general manager of sales, succeeding WILLARD S. HARING, recently elected vice-president in charge of sales on the Pacific Coast. Mr. MEYER has been assistant sales manager for about one year and was for a number of years metallurgist of the company. WILLIAM H. DICKSON, who has been with the Alan Wood company for the past 21 years and for 10 years as Philadelphia district sales manager, has been appointed assistant manager of sales and will make his headquarters at Ivy Rock.

C. B. HOUCK, who for the past 35 years has been in charge of the operation of railroad and traction lines in and around Hazleton, Pa., has been elected president of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. **WILBERT WEAR**, associated with Mr. Houck at Hazleton, has been elected treasurer and C. WILSON, JR., formerly general superintendent of the Harrisburg company, has been made vice-president and general superintendent. H. W. BISHOP, JR., continues as general sales manager and N. W. CASSELL is secretary in charge of purchases.

JACK L. HILTON has become manager of the Dalzell Brothers Co., Youngstown, engineer and fabricator, and will be assisted by H. L. DALZELL, sales engineer. Mr. Hilton was formerly manager of the plate fabricating department of the Commercial Shearing & Stamping Co., Youngstown.

ALFRED F. STENGEL has been appointed sales manager of the Tonawanda Iron Corporation, effective Jan. 15, having resigned his position with the Buffalo office of Semet-Solvay Co. The Tonawanda Iron Corporation will sell and distribute its pig iron direct. Sales offices will be located at North Tonawanda, N. Y. Mr. Stengel was associated with Rogers, Brown & Co., with headquarters at Buffalo, for more than 17 years, selling pig iron, coke and alloys and, when that com-



A. F. STENGEL

pany merged with Crocker Brothers, left to become vice-president of Waldo, Egbert & McClain. Later he was sales manager of the Mystic Iron Works at Boston.

FREDERICK E. GROSS, who has been in the pig iron business for the past seven years and recently resigned from the sales force of the Donner Steel Co., has become associated in a sales capacity with the Tonawanda Iron Corporation, North Tonawanda, N. Y.

M. W. DALLAS, who has been associated with E. C. Atkins & Co., Indianapolis, Ind., for the past five years, has been appointed advertising manager, succeeding the late Thomas A. Carroll.

JAMES CLEARY, who has been identified with the Combustion Engineering Corporation, New York, since 1921 in some of the branch offices of the company, has been made general sales manager.

ARTHUR C. PLETZ, heretofore assistant general sales manager of Pratt & Whitney Co., Hartford, Conn., has resigned to become works manager of the Aluminum Industries, Inc., Cincinnati.

FRANK A. FORD has been made western sales manager, with headquarters in the Chicago Daily News Building, Chicago, for John Bath &

was born in Andover, Mass., Nov. 12, 1862. He was graduated from Massachusetts Institute of Technology in 1884. His first industrial connection was as chemist and metallurgist for copper smelters in Vermont. Then he became assistant chemist for the Joliet Steel Co., Joliet, Ill., and later chemist for the Briar Hill Iron & Coal Co., Youngstown. After serving one year there as superintendent, he went to Cleveland to take charge of the ore department of Todd, Stambaugh & Co. In 1890 he was made general manager of the Buena Vista Iron Co. in Virginia, and in 1893 began with M. A. Hanna & Co., as salesman in the ore department. Several years later he became general manager of the furnace department and soon was admitted to the firm. Colonel Richards became vice-president of the M. A. Hanna Co. when it was incorporated and was chairman of its furnace subsidiary, the Hanna Furnace Co. He plans to live at 5 Mercer Circle, Cambridge, Mass., until June 1, when he will make his residence at Blue Hill, Me.

HERMAN A. WAGNER, president, Wisconsin Bridge & Iron Co., has been renominated for president of the Milwaukee Employers' Council without opposition for an eighth consecutive term. S. W. UTLEY, vice-president and manager of the Detroit Steel Casting Co., and president of the Michigan Manufacturers' Association, will be the guest speaker at the annual dinner of the employers' council following the election of officers.

Co., Worcester, Mass., manufacturer of ground taps, special machinery and precision tools. He will be assisted by PETER COLLINS, in Detroit, H. E. RICHMOND, in Michigan, L. T. BOHNET and E. G. DORAN, in Indiana, Illinois and Wisconsin.

HENRY MAAG, contract engineer for the H. K. Ferguson Co., Cleveland, engineer and builder, has been appointed manager of the new Chicago branch office recently opened by the company at 520 North Michigan Avenue, Chicago.

WALTER W. TANGEMAN, who has been associated with the Cincinnati Milling Machine Co. since 1909, has been elected vice-president of the company. He became a member of the organization while a student in the cooperative engineering department of the University of Cincinnati and for the past several years has been general sales manager. FREDERICK B. HEITKAMP, who has been assistant sales manager for several years, was promoted to general sales manager, succeeding Mr. Tangeman. Mr. Heitkamp was graduated from Rutgers University and came to the Milling Machine company in 1921.

C. R. CRANE II, and A. F. GARTZ, JR., assistant vice-presidents, have been elected vice-presidents of the Crane Co., Chicago.

P. P. EVANS, heretofore vice-president of the Osborn Engineering Co., Cleveland, has been elected president.

G. MILTON LOPER has been appointed sales representative in the Philadelphia territory for Cox & Sons Co., Bridgeton, N. J., manufacturer of pipe cutting and threading machines, scrap bundling machines and stokers.

FRED T. NEBEL, who has been connected with the machine tool industry for 30 years, for the past nine years as treasurer of the Rahn-Larmon Co., Cincinnati, manufacturer of lathes, has been elected president of that company. B. J. LARMON is vice-president and OLIVER M. DOCK is secretary. These men, together with GEORGE S. LOTT and HORACE TODD, comprise the board of directors.

GUY L. BAYLEY, for some time head of the Chicago office of Sanderson & Porter, consulting engineers, New York, has been admitted into the firm.

EDWARD N. HURLEY, chairman of the Hurley Machine Co., Chicago, and former chairman of the United States Shipping Board during the World War, has been elected president of the American Manufacturers Export Association.

A. J. JOHNSTON, district manager at Chicago for Hickman, Williams & Co., has been elected a vice-president of the company and also named to the executive and financial commit-

tees. He has been associated with the company since he was graduated from the University of Wisconsin in 1913. J. H. ABBOTT, for a number of years in the sales department, has been made resident manager, with headquarters in the Chicago office.

BENJAMIN O'SHEA heretofore president of the Union Carbide Co. and of the Electro Metallurgical Co., both units of Union Carbide & Carbon Corporation, New York, has been elected chairman of the board of each company. FRED H. HAGGERSON, former vice-president, has been made president, and F. P. GORMELY has become vice-president and general manager of both companies.

J. T. HAGAN has been appointed general manager of sales of the J. M. & L. A. Osborn Co., Cleveland steel jobber, and JOHN J. KOCH, assistant sales manager. At the annual meeting, Jan. 23, HAROLD J. SMITH and WILLIAM B. OSBORN, were elected members of the board of directors to fill vacancies. A. W. HOWE, president and general manager, and other officers were re-elected.

Crawford Elected Jones & Laughlin President

George Gordon Crawford was elected president of the Jones & Laughlin Steel Corporation at a meeting of the directors of the corporation Jan. 28. He was also made a member of the board of directors and of the executive committee.

For about 23 years he has been president of the Tennessee Coal, Iron & Railroad Co., Birmingham, a subsidiary of the United States Steel Corporation. It is understood that he will assume his new duties in the immediate future.

Mr. Crawford is a native of Georgia and was graduated from the Georgia School of Technology in 1890 and then studied for two years at Karl-Eberhard University at Tübingen, Germany. He was assistant superintendent of the Edgar Thomson blast furnaces of the Carnegie Steel Co. from 1895 to 1897, superintendent of the blast furnace and steel works of the National Tube Co. at McKeesport for the next two years, and then superintendent of the Edgar Thomson blast furnaces for two years. He was manager of the tube works and plants of the National Tube Co., when he was transferred to Birmingham in 1907.

Ryding Becomes President of Tennessee Company

Herbert C. Ryding was appointed president of the Tennessee Coal, Iron & Railroad Co. at Birmingham on Jan. 28, succeeding George Gordon Crawford, who resigned, effective Jan. 31. Mr. Ryding has been vice-president in charge of operations of the Tennessee company since 1917, and has had many years of service with the corporation.

Obituary

PHILIP NORTH MOORE, mining engineer for 56 years and president of the American Institute of Mining and Metallurgical Engineers in 1917, died in a hospital in St. Louis on Jan. 20, aged 80 years. He was graduated from Miami University, Oxford, Ohio, and in 1872 received his master's degree in the School of Mines of Columbia University. During the following six years he was engaged as assistant in Geological Survey departments of various states, and in 1882 became manager and director of the Slate Creek Iron Co., Ala. From 1896 to 1916 he was president of the Rose Run Iron Co., in Kentucky. He was also active in various other mining companies. During the war he served in the engineering division of the National Research Council and after the war he served as a member of the War Minerals Relief Commission of the Department of the Interior.

BYRON E. VEATCH, vice-president of the Bell Lock Co., Chicago, died Jan. 23. He lived in Chicago for more than 30 years, going there from the West, where he spent his early manhood as a cowboy.

HOWARD E. CHICKERING, sales manager of Fairbanks, Morse & Co., Chicago, died Jan. 24, after a week's illness of heart disease. Mr. Chickering had been connected with Fairbanks, Morse & Co. for 30 years. He was transferred to Chicago headquarters about eight years ago.

CHARLES G. WADE, consulting engineer, widely known in Milwaukee, Kansas City and Denver, where he had practiced in past years, died at his home in Milwaukee, Jan. 19, aged 69 years. For the most part he had maintained his own offices but was at various times connected with Allis-Chalmers Mfg. Co. and the Falk Co.

ALBERT M. SEEBOOTH, secretary and manager of the Albert Seebotth Co., manufacturer of wiping waste, Milwaukee, died suddenly, Jan. 16, aged 45 years. His father, the late Michael Seebotth, founded the business and was a pioneer in that field.

J. H. PECKHAM, who had been a salesman in the Hartford, Conn., office of Henry Prentiss & Co., machine tool dealers, for over 10 years, died Jan. 22, from blood poisoning. Prior to his connection with Henry Prentiss & Co., he was, for many years, with the Norton Co., Worcester, Mass.

JOHN HALL, chairman of the board, Hall & Pickles, Ltd., iron and steel merchant of Manchester, England, died Jan. 26, aged 59. During the war he was attached to the Ministry of Munitions and controlled the production of all British steel works and rolling mills. He had been a member of the Iron and Steel Institute since 1898.

Book Reviews

(Continued from page 372)

ing press by an electrical motor weighing less than a hundred pounds.

The author thinks that the lack of commercial success was due to the fact that labor-saving devices were of little interest a hundred years ago. It seems more probable that the chief difficulty was that the motor was ready before there was any electricity to run it, save from the expensive zinc batteries. As a matter of fact, most historical notes about early electrical machines relate to generators, or means of changing steam or water power into electricity, rather than the change of electricity into mechanical energy. It may have occurred to Davenport and his associates that they could generate electricity with their motor by driving it backward, so to speak, but if it did they rejected the plan of driving one electrical machine by another prime mover, merely to enable them to do with a second electrical machine what could readily be done by steam or water power direct.

The book is a plain tale of a plain New Englander who was far ahead of his time, only in Davenport's case there is no happy ending to the story.

E. E. T.

Handbook of Market Data

Market Data Handbook of United States. By Paul W. Stewart. 534 pages, 9 x 11 $\frac{1}{4}$ in., with five maps of trading areas. Government Printing Office (Superintendent of Documents), Washington. Price \$2.50.

To any manufacturer planning a nation-wide advertising campaign, to any sales manager fixing quotas and territories for his representatives, to any executive analyzing sales and distribution expenses in various regional outlets, this book will appeal. An enormous amount of material from governmental and private sources has been systematized and presented in such detail that it can be regrouped by any statistician into units shedding light on almost any marketing problem. Much of the information is presented for the first time. It comprises data for every county of the Union on population, income, manufacturing activities, wealth (bank deposits and automobile registration), newspaper and magazine circulation, number and size of farms, and number of electric and telephone customers—to mention none but the principal headings.

Consequently, the information will be valuable for appraising the market possibilities for the sale of industrial equipment as well as general consumption goods. Each problem in market measurement will require a different collation of the data here presented, but four large maps of the United States are included which will give immediate, if only approximate, answers to many questions, viz., wholesale grocery trade areas, areas of daily and Sunday newspaper circulation, retail trade areas, and trade areas for budgetary control.

E. E. T.

A Pair of Chemical Dictionaries

A Chemical Dictionary. By I. W. D. Hackh. 790 pages, 6 $\frac{1}{2}$ x 10 in., illustrated. P. Blakiston's Sons & Co., Inc., Philadelphia. Price \$10.

This book is a desirable reference work for the metallurgist and chemist. It offers certain advantages, since it is the only recent American edition of a chemical dictionary, and consists of but one volume as compared with the several of its English competitors. The general arrangement, two columns of clear type to a page, and the interesting makeup, including cuts of leading men of science, tables and charts (in many cases reproduced from original drawings), have proved of general interest and promote easy reference.

The scope is very broad and subjects are covered neces-

sarily briefly, but enough information can be secured rapidly by a busy executive to serve his purpose in many instances. For the laboratory man enough details are shown to assist him to verify the matter in textbooks or standard works on the metallurgical or chemical industry.

MARSHALL S. WALKER.

Gmelin's Handbuch der anorganischen Chemie. 224 pages, 6 $\frac{1}{4}$ x 10 in. Published by the German Chemical Society, Berlin. Price 33 marks. (Subscription price 26 marks.)

Part "A" of the new Gmelin on iron will be of general interest to metallurgists, while Part "B" will be more of interest to chemists. The first number of Part "A" contains 224 pages and, as might be expected, is both comprehensive and thorough, with an immense amount of information. Beginning with a valuable historical bibliography, the next 125 pages cover the geology and mineralogy of iron, including some production and consumption statistics of various countries. Electrolytic and chemical methods of producing pure iron are next discussed, with a brief account of the uses of electrolytic iron. Some special forms of iron are also described.

This number will be very valuable as reference for the items covered, while the extensive bibliographical references will simplify the quest for more complete information.

SAMUEL L. HOYT.

Foundry Accounting, as Done in Germany

Die Betriebspraxis der Eisen-Stahl-und Metallgiesserei. By Hubert Hermanns. Published by Wilhelm Knapp, Halle, Germany. 96 pages, 6 $\frac{1}{2}$ x 9 $\frac{1}{4}$ in., 38 forms, 13 diagrams. Price 5.40 marks.

This formidable title refers to cost accounting with especial reference to foundry practice. The book is valuable because it gives many concrete examples of the influence of some forty-two processes involved in making a casting. "Overhead" is discussed in detail, but the assumption that the average foundryman—either German or American—can apply algebraical formulas to its distribution, is unwarranted.

Nine accounts are recommended by the author, whereas in extensive American foundries four times that many are common. The graphic curves given to supplement or explain the tables or the algebraic equations are clear; and for most persons necessary. Of course, each plant must make its own curves to apply to the factors existing in that particular organization, and these must be revised as conditions change. Such skeleton tables and curves, to be completed from time to time by subsequent experience and by calculated interpolation, are especially valuable in cost estimating—a far more difficult operation than cost accounting.

ROBERT GRIMSHAW.

Notes on New Books

Engineering Drawing. By Thomas E. French. Fourth edition, 466 pages, 6 x 9 in., illustrated. McGraw-Hill Book Co., New York. Price \$3.

This widely-used manual for engineering students and draftsmen has been revised to conform to several of the standards sponsored by the American Standards Association such as screw threads, bolts and nuts, cap screws, keys, screwed and flanged pipe fittings, rivets, tapers, symbols and drafting room practice. The expanded number of problems has been increased from 76 to 120, and include new automotive, airplane and electrical problems.

Abstracts of articles on the fatigue of metals under repeated stress which have appeared in the technical press from July 1, 1928, to June 30, 1929, have been prepared by the research committee on fatigue of metals of the Ameri-

can Society for Testing Materials and published in pamphlet form. The abstracts cover 27 pages.

The 12 papers which constituted a "Symposium on the Physical Properties of Cast Iron," held by the American Society for Testing Materials at its annual convention in June, 1929, in Atlantic City, have been published in pamphlet form by the society. The discussion which developed is also included, as well as the report of sub-committees of committee A-3 on correlation of test bar and casting and on the heat treatment of cast iron. The pamphlet contains 118 pages and is well illustrated.

Wholesale prices from 1913 to 1928 are covered in tabular form, with diagrams, in Bulletin 493 of the United States Bureau of Labor Statistics. This bulletin runs more than 260 pages and contains a large amount of information about several hundreds of items. In general, data are given monthly for 1927 and 1928, accompanied by yearly averages for each year from 1913 to 1928 inclusive.

Retail prices from 1890 to 1928 are covered in Bulletin 495 of the United States Bureau of Labor Statistics, which runs to 220 pages. The book covers primarily foods, coal, gas and electricity, together with purchasing power of union wages and comparison of retail price changes in foreign countries.

Two notable volumes of commercial data appear almost simultaneously. One is "Mechanical Catalogue" published by the American Society of Mechanical Engineers, New York, and the other is "Chemical Engineering Catalogue" published by Chemical Catalogue Co., New York, supervised by a committee appointed by prominent organizations of chemists. Each of them is the latest of over a dozen annual issues, and catalogues in uniform manner the equipment, machinery, and supplies consumed or produced by the prominent firms in the respective industries. In both volumes it is apparent that a consistent and successful effort has been made to present data on sizes and performance which will enable a prospective purchaser to select the most adequate article for his especial purposes, and to suppress the generalities found in most advertising pages. In other words the books are worthy of their names "catalogues" and not merely collections of advertisements. Extensive cross indexes enhance the usefulness of the volumes.

Proceedings of the Second National Conference on Merchant Marine, which was held under the auspices of the United States Shipping Board, in Washington, in January, have been published in a book of 201 pages. One of the most important discussions contained in the book is on the greater cost of manufacture of ships in the United States, compared with costs in Europe and Japan. Differentials were reported as high as 60 or 65 per cent in some cases, and rarely under 33 per cent. This subject has been discussed for years, and many futile efforts have been made to overcome the differential, through subsidies to American marine ships or by other means. As H. G. Smith, vice-president, Bethlehem Shipbuilding Corporation, put it: "A large differential . . . has always existed in connection with building steel vessels, and always will exist as long as living conditions in the United States are on a higher plane than those abroad."

Engineering achievements in the electrical industry are covered in a recent special publication of the Westinghouse Electric & Mfg. Co., East Pittsburgh. A number of interesting illustrations in the steel industry are included, as well as various other methods of electrical utilization.

More than 600 gray iron foundries submitted data to the United States Department of Commerce in response to a questionnaire regarding their operations. Foundries producing castings for their own use operated at 55 per cent in the two years from July 1, 1925, compared with

only 43 per cent for jobbing foundries and 46 per cent for those producing both for sale and for their own use. This and other data secured is published by the Bureau of Foreign and Domestic Commerce in a 60-page pamphlet, which is illustrated by numerous diagrams showing how the operations varied according to section of the country, size of the plant, weight of individual castings and other individual features. Efficiency of operation as measured by the number of molders employed for certain units of output was one feature of the study.

"Statistical Abstract of the United States" for 1929 has just been published by the Department of Commerce (E. D. Durand, chief of division of statistical research) and is obtainable from the Superintendent of Documents for \$1. It contains a digest of data accumulated during the fiscal year by all statistical agencies of the Government, as well as several cooperating private and state organizations. Its 849 pages contain 833 tables of data on health, education, finance, utilities, commerce, agriculture, mining and manufacturing. In all instances the figures are given without comment or interpretation, except to show parallel columns of data for former years.

A fourth edition of "Hütte's Iron and Steel Handbook (Taschenbuch für Eisenhüttenleute) has been published by Wilhelm Ernst & Sohn, Berlin, Germany, leather bound at 38 marks. In addition to a critical revision of the 1922 edition, the present 968-page volume includes new matter on heat treatment, cutting tools, welding, and forging. A cursory inspection impresses one with the comprehensiveness and accuracy of the book; however, it is sadly deteriorated from the pre-war quality of paper, presswork and binding.

New Books Received

Hand-to-Mouth Buying. By Leverett S. Lyon. 487 pages, 5½ x 7½ in., illustrated. Brookings Institution, 26 Jackson Place, Washington. Price \$4.

Steel Treating Practice. By Ralph H. Sherry. 399 pages, 6 x 9¼ in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price \$4.

Railroad Purchasing and the Business Cycle. By John E. Partington. 309 pages, 6¼ x 9¼ in., illustrated. Brookings Institution. Price \$3.

The Manufacture of Chilled Iron Rolls. By Archibald Allison. 112 pages, 5½ x 8¾ in., illustrated. Isaac Pitman & Sons, 2 West Forty-fifth Street, New York. Price \$2.50.

Wage Incentive Methods. By Charles Walter Lytle. 457 pages, 6 x 8½ in., illustrated. Ronald Press Co., 15 East Twenty-sixth Street, New York. Price \$7.50.

Materials Handling Equipment. By Edward J. Tournier. 371 pages, 6 x 9¼ in., illustrated. McGraw-Hill Book Co. Price \$4.

Earnings in Standard Machine Tool Occupations in Philadelphia. By H. Larue Frain. 85 pages, 6 x 9¼ in. University of Pennsylvania Press, Philadelphia. Price \$1.50.

Conditional Sales. By Roger Sherman Hoar. 521 pages, 6 x 8¾ in. Ronald Press Co. Price \$10.

Official Proceedings of the Twenty-ninth Convention of the International Acetylene Association. 289 pages, 6¼ x 9½ in., illustrated. International Acetylene Association, 17 East Forty-second Street, New York.

A Picture of World Economic Conditions in the Summer of 1929. 309 pages, 6¼ x 9¼ in. National Industrial Conference Board, 247 Park Avenue, New York. Price \$2.50.

Year's Exports Highest Since 1920

Drop in December in Both Exports and Imports—Most of Export Gain Was in Finished, Rolled Products, in Which Imports Declined

WASHINGTON, Jan. 25.—While exports of iron and steel products from the United States declined to 215,242 gross tons in December, the smallest monthly outgoing movement since April, 1928, with a total of 215,183 tons, the aggregate for last year was 3,032,352 tons, the highest since 1920. That year had a total of 4,927,800 tons. Last year also was 167,249 tons in excess of 1928 exports. The December exports were 26,587 tons under those of 241,829 tons in November, and 6949 tons less than the 222,191 tons in December, 1928.

Imports in December, amounting to 47,486 tons, were the smallest monthly incoming shipments since November, 1924, with a total of

35,707 tons. For the year they were 739,004 tons, the smallest movement for any 12-month period since 1924, with a total of 556,814 tons. Receipts in December were 6555 tons less than those of November, 54,041 tons, and for the year 1929 they declined 43,668 tons from the preceding year's 782,672 tons. Imports in December, 1928, were 55,362 tons.

The principal gains in exports last year when compared with those of 1928 were in scrap, steel bars, plates, plain structural material, fabricated material and black and galvanized welded pipe. The more important losses were reflected in exports of pig iron and steel rails. The greater decreases in December when compared

with November of last year were made in ingots and blooms, skelp, plates, and plain and fabricated structural material. Gains were made in substantial quantities in galvanized sheets, tin plate and black and galvanized welded pipe.

The heaviest loss in imports in 1929 when compared with the previous year was in steel bars, which dropped to 38,219 tons, from 85,348 tons, while other important decreases were made in hoops, bands and cotton ties, structural shapes and cast iron pipe. Sizable increases were made in ferromanganese and scrap, with some fair gains in a few finished lines. The greatest loss in December when compared with November was in struc-

Exports of Iron and Steel from the United States

(In Gross Tons)

	December		12 Months Ended December	
	1929	1928	1929	1928
Pig iron	1,618	8,414	46,352	84,682
Ferromanganese	83	582	1,574	9,440
Scrap	56,473	36,308	552,372	516,139
Pig iron, ferroalloys and scrap	58,174	45,304	600,298	610,261
Ingots, blooms, billets, sheet bar	784	1,626	45,578	30,109
Skelp	1,636	3,886	130,975	131,754
Wire rods	3,056	2,830	42,250	38,617
Semi-finished steel	5,476	8,342	218,803	200,472
Steel bars	8,268	14,937	190,023	158,475
Alloy steel bars	1,377	707	15,744	14,079
Iron bars	221	1,187	4,074	6,229
Plates, iron and steel	11,305	18,736	193,695	166,269
Sheets, galvanized	12,078	13,759	154,533	152,280
Sheets, black steel	9,365	12,766	170,782	179,286
Sheets, black iron	1,205	1,454	15,955	16,289
Hoops, bands, strip steel	5,207	5,612	70,753	58,080
Tin plate; terne plate	24,522	17,307	258,965	249,642
Structural shapes, plain material	14,841	17,086	273,096	202,304
Structural material, fabricated	5,848	9,549	112,235	92,758
Steel rails	10,934	12,114	149,234	190,905
Rail fastenings, switches, frogs, etc	2,954	3,240	32,614	41,995
Boiler tubes	1,918	1,392	19,473	18,749
Casing and oil line pipe	6,983	7,871	117,025	119,785
Black and galvanized pipe	15,278	7,122	145,937	110,361
Plain wire	3,275	3,581	45,629	46,177
Barbed wire and woven wire fencing	4,397	5,371	64,463	74,335
Wire cloth and screening	113	203	1,692	1,884
Wire rope	375	610	6,959	5,367
Wire nails	806	1,007	12,887	14,547
Other nails and tacks	642	879	10,256	9,892
Horseshoes	9	48	440	468
Bolts, nuts, rivets and washers, except track	1,479	857	16,235	13,278
Rolled and finished steel	142,500	157,395	2,082,699	1,943,934
Cast iron pipe and fittings	3,610	2,813	45,761	33,979
Car wheels and axles	1,177	2,569	21,460	17,139
Malleable iron screwed fittings	1,232	959	12,514	10,034
Iron castings	697	1,695	10,976	12,061
Steel castings	503	1,129	10,824	9,710
Forgings	710	821	12,097	11,703
Castings and forgings	7,929	9,986	113,632	94,626
All other	1,163	1,164	16,920	15,810
Total	215,242	222,191	3,032,352	2,865,103

Imports of Iron and Steel into the United States

(In Gross Tons)

	December		12 Months Ended December	
	1929	1928	1929	1928
Pig iron	17,172	10,825	147,763	140,644
Ferromanganese*	3,229	3,277	62,645	47,170
Ferrochrome†	48	48	645	707
Ferrosilicon‡	453	946	9,426	4,456
Scrap	1,759	6,548	90,464	63,314
Pig iron, ferroalloys and scrap	22,661	21,644	310,943	256,291
Steel ingots, blooms, billets and slabs	1,705	1,218	26,494	21,441
Wire rods	1,039	4,328	15,653	19,298
Semi-finished steel	2,744	5,546	42,147	40,739
Rails and splice bars	199	684	6,586	15,175
Structural shapes	8,243	10,100	148,156	163,761
Boiler and other plates	—	107	3,243	8,025
Sheets and saw plates	2,540	1,264	25,218	22,774
Steel bars	2,805	3,224	38,219	85,348
Bar iron	319	109	2,932	2,444
Hoops, bands and cotton ties	1,563	1,645	42,146	51,785
Tubular products (wrot.)	3,020	4,404	40,521	45,495
Nails, tacks, staples	740	799	9,130	10,136
Tin plate	19	51	286	922
Bolts, nuts, rivets and washers	74	51	429	278
Round iron and steel wire	476	443	5,825	4,702
Barbed wire	544	831	5,999	5,635
Flat wire; strip steel	154	256	2,175	2,563
Steel telegraph and telephone wire	—	—	26	173
Wire rope and strand	222	157	2,549	1,676
Other wire	63	90	498	774
Rolled and finished steel	20,981	24,215	333,938	421,666
Cast iron pipe	975	3,529	50,074	60,794
Castings and forgings	125	428	1,902	3,182
Total	47,486	55,362	739,004	782,672
Manganese ore*	15,302	20,365	323,935	308,594
Iron ore	286,055	204,799	3,139,334	2,620,717
Magnesite (dead burned)	1,455	4,310	45,675	44,976

*Manganese content only.

†Chromium content only.

‡Silicon content only.

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS (In Gross Tons)			
	Dec.	Nov.	Oct.
Austria	45	1	89
Belgium	7,458	10,110	11,574
Czechoslovakia	31	53	38
France	2,871	4,768	6,272
Germany	3,470	9,218	8,400
Italy	36	691	395
Netherlands	3,823	675	585
Norway	1,125	1,408	4,294
Sweden	2,864	4,043	2,819
Switzerland	5	4	30
United Kingdom	7,461	6,473	1,950
Europe	35,259	37,659	36,226
Canada	3,426	9,010	18,052
Mexico .....	.....	.....	60
Panama .....	.....	41	.....
Cuba .....	.....	228	.....
British India	8,798	7,553	8,846
China .....	.....	44	.....
Hongkong	1	.....	.....
Japan	2	6	2
Miscellaneous .....	.....	5	1
Total	47,486	54,041	63,226

tural shapes, which declined to 8243 tons from 11,961 tons.

Of the exports in 1929, Canada took 1,227,544 tons, or 40.8 per cent of the total, against 1,178,063 tons, or 41.1 per cent of the 1928 total. In December, exports to Canada were 61,093 tons, a sharp drop under the 102,524 tons shipped to that country in November. Exports to Japan in 1929 were 427,755 tons, or 14.2 per cent of the total, compared with 411,754 tons, or 14.3 per cent of the 1928 total. Exports to Japan in December rose to 54,339 tons from 42,550 tons in November, and were but 6754 tons under the tonnage shipped to Canada, invariably the leading consumer of American exports.

Germany led as the source of imports in December, providing 9470 tons, while shipments from India, totaling 8798 tons, made up of pig iron, gave second rank to the latter country. The United Kingdom supplied 7461 tons and Belgium 7458 tons.

The largest item of exportation in both December and the year 1929 was scrap, the shipments being 56,473

tons and 552,372 tons, respectively. Scrap was shipped in December largely to Japan, 41,218 tons; Italy, 5602 tons; and Canada, 5498 tons. The largest exports of finished lines last year were in plain structural shapes, 273,096 tons, of which 230,048 tons went to Canada, which, in December, took 12,440 tons. Exports of plain material to Japan last year were 3346 tons, a sharp gain over the 2387 tons for the previous year.

Tin plate constituted the next most important item of exportation last year, the total being 258,965 tons, while the December exports of 24,522 tons represented the largest outgoing movement in rolled products. Japan led as the foreign market for American tin plate in both December and the year, taking 5143 tons and 61,814 tons, respectively. Canada was second, taking 3681 tons and 46,213 tons.

Of the 10,240 tons of black welded pipe exported in December, 2349 tons went to Mexico and 2270 tons to Soviet Russia. Of the 5038 tons of galvanized welded pipe exported during that month, 1536 tons went to Venezuela and 917 tons to Argentina. Venezuela took 2633 tons of the 6983 tons of casing and oil line pipe exported, while Argentina took 969 tons and Mexico 521 tons.

Of the 8243 tons of shapes imported in December, 4674 tons came from Belgium, 2424 tons from Germany and 1002 tons from France. Sweden supplied 1377 tons of the 2805 tons of steel bars imported, while 560 tons came from Belgium, 473 tons from Germany and 173 tons from France.

Of the 3229 tons of ferromanganese imported in December, 1678 tons came from the United Kingdom, 817 tons from Norway and 734 tons from Canada. Brazil supplied 9392 tons of the 15,302 tons of manganese concentrates imported during the month, while 2860 tons came from India, 2800 tons from the Gold Coast of Africa and 247 tons from Soviet Russia.

ther above the imports for December, 1928, at 10,825 tons.

For the twelve months the total of 147,763 tons is about 5 per cent greater than the 140,644 tons of 1928. Both figures are less than one-third the incoming movement in 1926 and scarcely more than one-third that of 1925.

For the year the contribution of

India has been slightly less than one-half the total, with United Kingdom, Netherlands and Canada following in that order, but some distance lower. In 1928 both Sweden and Norway were ahead of Canada, but otherwise the order was the same.

Japanese Pig Iron Buyers and Sellers Agree

YOKOHAMA, JAPAN, Dec. 30.—The Sentetsu-Kyodo-Kumai, an association recently formed by pig iron buyers, has made an agreement with producers in Japan to buy domestically, except for about one-third of their requirements, representing grades not made by Japanese furnaces. The agreement is to be effective for a period of three years, beginning Sept. 1, 1930. A provisional arrangement has been made on the same terms, effective from April 1 to Sept. 1.

German Plant to Make Steel from Sponge Iron

HAMBURG, GERMANY, Jan. 13.—The first steel to be produced in Germany from sponge iron will be made late in February when the Eisenschwammgesellschaft G.m.b.H., Bochum, begins operation. The plant will operate under Norwegian patents and is designed for an annual output of about 30,000 tons of steel. It is controlled by the Friedrich Krupp A. G., Essen, the Vereinigte Stahlwerke, A. G., Düsseldorf, and the German Dye Stuff Corporation.

All-Steel Zeppelin Hangar at Friedrichshafen

HAMBURG, GERMANY, Jan. 13.—A new Zeppelin hall at Friedrichshafen, of all-steel construction, has just been completed by the Gutehoffnungshütte, Oberhausen. The new hangar, which will house a new Zeppelin, the Z-129, which will have 50 per cent more volume than the Graf Zeppelin, is 250 m. long, 50 m. wide and has a 46 m. ceiling. (820 ft., 164 ft., 151 ft.) The latest dirigible will be started in February or March and plans call for completion in 16 to 18 months.

World Power Conference in Berlin in June

The second World Power Congress will be held at Berlin, Germany, June 16 to 25. An American committee has been formed, with O. C. Merrill, Edmonds Building, Washington, as chairman, to care for an American delegation, for which the steamship Resolute of the Hamburg-American Line has been engaged, sailing from New York on June 4. The tour from the United States will be under the management of the American Express Co., and will cover hotel arrangements in Berlin, where 4000 to 5000 are expected to be in attendance at the conference. For the conference itself the American committee will present a total of 63 papers.

UNITED STATES IMPORTS OF PIG IRON BY COUNTRIES OF SHIPMENT

	(In Gross Tons)		12 Months Ended December	
	December	1929	1928	1929
India	8,798	5,324	68,968	56,420
United Kingdom	4,062	2,190	39,140	49,694
Germany .....	.....	300	103	695
France .....	.....	.....	101	330
Netherlands	3,760	2,523	24,189	26,989
Sweden	260	199	3,534	2,524
Norway	307	160	3,400	1,186
Canada	45	552	7,382	1,015
Belgium .....	.....	.....	284	222
All others .....	.....	37	662	1,563
Total	17,172	10,825	147,763	140,644

Price Maintenance in Foreign Markets

British Pig Iron and Japanese Black Sheets Hold Up or Advance—
Cartel vs. American Exports—Scrap More Active on Continent

(By Cable)

LONDON, ENGLAND, Jan. 28.

FUEL is cheaper, but pig iron producers are maintaining prices, claiming that there is still insufficient profit. Consumers continue to delay buying, so that business is only moderate.

Dorman, Long & Co. are closing the Carlton Iron Works where one blast furnace is operating on ferromanganese. Production is to be concentrated at the South Bank works.

Hematite makers are well sold for forward delivery, but premiums are no longer obtainable for prompt shipment. Mixed numbers have been offered down to £3 18s. (\$19.03) per ton.

Finished iron and steel markets are dull, especially for export, but domestic consumers are supplying their regular specifications and works are consequently fairly well engaged.

Tin plate is quiet, consumers being influenced by the poor tin market. Makers, however, are well sold and not pressing for business. Mills outside the association have accepted 18s. 7½d. (\$4.54) per base box, but other makers are adhering to 18s. 9d. (\$4.57) per base box, f.o.b. works port.

Galvanized sheets are weak on continued lack of substantial demand. Black sheets continue quiet.

The National Federation of Iron and Steel Manufacturers has addressed a letter to the Government protesting against the Government's proposed amendments to the coal

mines bill relating to compulsory consolidations. The letter states that to be successful amalgamations must be the natural result of a community of interests of the companies concerned and should not be enforced by statute. The coal bill will increase fuel costs and the federation believes that it will hinder a general industrial recovery.

Marshall Sons & Co., agricultural and general engineers of Gainsborough, are acquiring Clayton & Shuttleworth, Ltd., of Lincoln, under the rationalization plan.

Continental markets are inactive, sellers endeavoring to obtain the prices fixed by the cartel, but buyers are uncertain of their firmness.

The International Steel Cartel is reported to have decided definitely to establish central selling offices for six months, beginning Feb. 1. It has further been proposed that the various national syndicates quote e.i.f. prices instead of f.o.b. prices for export.

German output in December was 1,156,000 metric tons of raw steel and 802,000 tons of rolled products. Luxembourg output was 245,000 tons of pig iron and 217,000 tons of raw steel. Belgian output was 340,000 tons of pig iron, 312,000 tons of raw steel and 284,000 tons of rolled products. Saar output was 173,000 tons of pig iron, 168,000 tons of raw steel and 170,000 tons of rolled steel products.

Does Not Endanger American Exports

Cartel Controls 1,000,000 Tons of Steel Monthly—Wire, Sheets and Tin Plate Not Included

HAMBURG, GERMANY, Jan. 13.—Comments in the press to the effect that the International Steel Cartel, as a selling organization, will provide severe competition for American steel mills is rather generally discounted by members of the syndicate.

It is agreed that the new organization will afford a means of fostering export trade and will control prices and conditions of contracts. The cartel will have available for export about 1,000,000 tons of steel products

a month and will have a virtual monopoly of certain products. But it is pointed out by steel mills here that serious competition with American mills is not at all likely, since most exports from the United States are to markets where there is a decided preference for American material and specifications, such as Canada and Central and South American countries, which politically favor trade with the United States. The larger part of the production exported by

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.88

British Prices f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3 12½s.	to £3 13½s.	\$17.69	to \$17.93
East Coast hematite	3 18	to 4 0	19.03	to 19.52
Ferromanganese, export	12 5	to 12 15	59.42	to 62.22
Billets, open-hearth	6 2½	to 6 12½	29.89	to 32.33
Sheet bars, open-hearth	5 17½	to 6 5	28.67	to 30.50
Black sheets, Japanese specifications	12 10		61.00	
Tin plate, per base box	0 18½	to 0 18½	4.48	to 4.51
Rails, 60 lb. and heavier	7 15	to 8 15	37.59	to 42.43
Steel bars, open-hearth	8 0	to 8 10	1.74	to 1.85
Beams, open-hearth	7 7½	to 7 17½	1.60	to 1.72
Channels, open-hearth	7 12½	to 8 12½	1.66	to 1.91
Angles, open-hearth	7 7½	to 7 17½	1.60	to 1.72
Ship plates, open-hearth	7 15	to 8 5	1.69	to 1.79
Black sheets, No. 24 gage	9 15	to 10 0	2.12	to 2.18
Galvanized sheets, No. 24 gage	11 15	to 12 0	2.56	to 2.57

Sheet bars, Thomas	4 11	to 4 13	22.20	to 22.69
Wire rods, low C., No. 5 B.W.G.	6 2	to 6 4	29.77	to 30.26
Rails, 60 lb. and heavier	6 8½	to 6 10*	31.35	to 31.72
Rails, light	6 0		29.28	
Steel bars, merchant	5 5	to 5 6	1.14	to 1.15
Steel bars, deformed	5 3	to 5 5	1.12	to 1.14
Beams, Thomas, British standard	5 0	to 5 4	1.09	to 1.13
Channels, Thomas, American sections	5 12	to 5 14	1.22	to 1.24
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 0	to 5 6	1.09	to 1.15
Angles, Thomas, 3-in.	5 6		1.14	
Ship plates open-hearth inspected	7 2	to 7 5	1.55	to 1.58
Black sheets, No. 31 gage, Japanese	12 1	to 12 4	2.61	to 2.66
Hoop and strip steel over 6-in. base	5 11½	to 5 12½	1.21	to 1.22
Wire, plain, No. 8 gage	7 0		1.52	
Wire, galvanized, No. 8 gage	8 9		1.83	
Wire, barbed, 4-pt. No. 12 B.W.G.	11 1½		2.41	
Wire nails, base	0 6½		\$1.55	per kg
Wire nails, assortments 1 to 6-in. keg	10 6½		2.69	

*Open-hearth steel, 8s. (\$1.94) per ton extra.

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3 7s.	to £3 11½s.	\$16.35	to \$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3 5	to 3 6	15.86	to 16.11
Billets, Thomas	4 11	to 4 12½	22.20	to 22.57

interest is 6.25c., New York, as the contract price.

Zinc.—Prices of prime Western slab zinc continue to advance, and only a very little metal, if any, is available, at 5.25c., East St. Louis, practically all producers asking 5.30c. Inquiry continues good and considerable business is still being booked for the first quarter, with some April metal also included. Consumers are inquiring for second quarter delivery, but producers are reluctant to book that far ahead, although in some cases a little May metal has been contracted for. Quotations are firm at 5.30c., East St. Louis, or 5.65c., New York. The ore position is exceedingly tight. Severe weather in the Joplin district has intensified voluntary curtailment and production last week was at a low record of about 2400 tons. Total sales were only about 2100 tons, for which \$35 was paid, which is the prevailing quotation. With the total surplus down to about 32,000 tons, it is stated that at least 30,000 of this is not for sale below \$38 to \$40, Joplin.

Antimony.—Some good consuming business has been booked and the market has stiffened. Chinese metal for spot and February delivery is higher at 8.87½c., New York, duty paid. The spread between spot and futures is still large, the latter being quoted at 8.25c., duty paid.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is obtainable at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Jan. 28.—This market is more active in sales and shipments and prices are unchanged. Quotations on tin, after dropping one cent early in the week, recovered. The old metal market is moderately active.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 39.37½c.; lead, 6.20c.; zinc, 5.25c.; in less-than-carload lots, antimony, 10c. On old metals we quote copper wire crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Central Alloy Completes Normalizing Furnace

The Central Alloy Steel Corporation, Massillon, Ohio, has placed in operation at its Canton, Ohio, plant a new normalizing furnace that was especially designed by the company's engineers, which, it is stated, is producing unusual results in the heat treatment of special steels. It is stated that this furnace permits uniform annealing of sheets and accurate control of grain structure and that heating operations formerly requiring 44 hr., are now completed in 15 min.

Annual Foundry Conference at Wisconsin University

The fourth annual foundry conference of the department of mining and metallurgy of the University of Wisconsin will be held at the university in Madison, Wis., Feb. 4 to 6. As usual, the round table methods of presenting foundry problems and seeking their solution will be adopted. Each group will be headed by a leader in his field.

The first session will be held Tuesday afternoon, Feb. 4, at which C. R. Messenger, president, Chain Belt Co.; L. R. Clauson, president, J. I. Case Co.; Francis B. Foley, metallurgist, Midvale Steel Co., and D. G. Anderson, foundry development engineer, Western Electric Co., will address the group on subjects of general interest to foundrymen.

At the morning and afternoon sessions, Feb. 5 and 6, the schedule of subjects of the round table discussions and their leaders are as follows:

Cupola Practice—C. J. Scullin, Scullin Tucker Laboratories; Thomas G. Stewart, foundry superintendent, J. I. Case Co.

Sand Conditioning—Harry W. Dietert, United States Radiator Corporation, Detroit.

Foundry Practice—E. M. Handley, foundry superintendent, Chain Belt Co., Milwaukee; William P. Bradley, foundry superintendent, National Steel Foundries, Milwaukee.

Steel Castings—B. Aamodt, Milwaukee Steel Foundry Co., Milwaukee; J. C. Schweitzer, Sivyer Steel Casting Co., Milwaukee.

Malleable Iron—P. C. De Bruyne, superintendent Moline Malleable Iron Co., St. Charles, Ill.; Dr. Anson Hayes, manager of research, American Rolling Mill Co., Middletown, Ohio.

High-Test Iron—Dr. Fritz Meyer, metallurgist, National Radiator Co., Johnstown, Pa.

Heat Treatment of Steel—F. Kubosch, metallurgist, Thurner Heat Treating Co., Milwaukee; J. R. Houston, metallurgist, Harnischfeger Corporation, Milwaukee.

Foundry Management—H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y.

Apprentice Training—C. J. Freund, Supervisor of Apprentices, Falk Co., Milwaukee.

Automotive Engineers Elect Officers

The recent annual election of officers of the Society of Automotive Engineers for 1930 resulted in the selection of Edward P. Warner, editor of *Aviation*, New York, and formerly assistant secretary of the Navy for aeronautics, for president.

Vice-presidents are: Chance M. Vought, Chance Vought Corporation, New York, representing aircraft engineering; Bruce G. Leighton, director of sales and service, Wright Aeronautical Corporation, Paterson, N. J., representing aircraft engine engineering; O. D. Treiber, president, Treiber Diesel Engine Corporation, Camden, N. J., representing Diesel engine engineering, and Arthur J. Scaife, consulting field engineer, White Motor

Co., Cleveland, representing motor truck engineering. Also George L. McCain, research engineer, Chrysler Corporation, Detroit, representing passenger car engineering; John Younger, professor of industrial engineering, Ohio State University, Columbus, representing production engineering; and F. C. Horner, assistant to the vice-president, General Motors Corporation, New York, representing transportation and maintenance.

Members elected to the Council, to serve for two years, are: Ralph R. Teetor, engineer, Perfect Circle Co., Hagerstown, Ind.; F. K. Glynn, engineer in charge of operation and maintenance of automotive equipment, American Telephone & Telegraph Company, New York, and A. W. S. Herrington, general manager, Coleman Motors Corporation, Washington.

C. B. Whittelsey, Jr., is treasurer.

The society will celebrate its quarter-century anniversary this summer. Its roster now includes more than 7000 automotive engineers and executives.

The annual meeting of the society, held at the Book-Cadillac Hotel, Detroit, last week comprises some 17 sessions, for which a large number of papers have been prepared for discussion. In addition to a Diesel engine session and a transportation conference, a body conference will be held on Thursday, Jan. 23. Papers include "Sheet Metal and Its Fabrication for Automobile Bodies," by Dr. G. L. Kelley, Edward G. Budd Mfg. Co., Philadelphia, and "European All-Metal Body Construction," by T. L. Hibbard, Hibbard & Darrin. At the inventions session, Jan. 24, W. J. Davidson, General Motors Corporation, will speak on "The Work of the New Devices Committee of the General Motors Corporation."

To Honor Industrialists with Gold Medals

Industrialists as well as men in the shops and factories will be given public recognition for outstanding achievements in industry under a plan formulated by the officials of MacDonald Brothers Engineering Laboratories, Inc., of Massachusetts, a company formed to erect and operate a year-round permanent exposition of industrial tools and equipment at Detroit.

The men who make the most outstanding contributions to industry each year will be awarded gold medals and substantial cash prizes by the MacDonald Brothers organization. A committee composed of American industrialists will determine the conditions of the awards. H. E. MacDonald, vice-president and general manager of the laboratory organization, says the committee on awards will be appointed this year before the completion of the laboratory building in Detroit.

PERSONAL

FRANKLIN B. RICHARDS, for many years nationally prominent in the pig iron and iron ore industries, is retiring from active participation in business. He has resigned as director of the M. A. Hanna Co., Cleveland, but will continue as a director of the Hanna Furnace Co. Colonel Richards



F. B. RICHARDS

was born in Andover, Mass., Nov. 12, 1862. He was graduated from Massachusetts Institute of Technology in 1884. His first industrial connection was as chemist and metallurgist for copper smelters in Vermont. Then he became assistant chemist for the Joliet Steel Co., Joliet, Ill., and later chemist for the Briar Hill Iron & Coal Co., Youngstown. After serving one year there as superintendent, he went to Cleveland to take charge of the ore department of Todd, Stambaugh & Co. In 1890 he was made general manager of the Buena Vista Iron Co. in Virginia, and in 1893 began with M. A. Hanna & Co., as salesman in the ore department. Several years later he became general manager of the furnace department and soon was admitted to the firm. Colonel Richards became vice-president of the M. A. Hanna Co. when it was incorporated and was chairman of its furnace subsidiary, the Hanna Furnace Co. He plans to live at 5 Mercer Circle, Cambridge, Mass., until June 1, when he will make his residence at Blue Hill, Me.

HERMAN A. WAGNER, president, Wisconsin Bridge & Iron Co., has been renominated for president of the Milwaukee Employers' Council without opposition for an eighth consecutive term. S. W. UTLEY, vice-president and manager of the Detroit Steel Casting Co., and president of the Michigan Manufacturers' Association, will be the guest speaker at the annual dinner of the employers' council following the election of officers.

CHARLES H. MORSE, chairman of the board of directors of Fairbanks, Morse & Co., whose principal plant is at Beloit, Wis., has given \$100,000 to Beloit College, of which he has been a trustee for the last 25 years, for the building and equipment of a recitation hall.

W. W. LEWIS, formerly technical director of Armco International Corporation, Middletown, Ohio, has been appointed assistant to W. W. SEBALD, vice-president in charge of general commercial activities and developments for the American Rolling Mill Co. Mr. Lewis joined the company in 1917 as assistant open-hearth superintendent at Middletown and was successively superintendent of steel works at the Ashland plant, member of the export department, and manager of the branch office in London, and technical director. He is at present abroad but plans to return about Feb. 15 to take up his new duties.

C. E. STINE, of the Detroit office of the Reliance Electric & Engineering Co., Cleveland, has been placed in charge of the newly-established Toledo, Ohio, office of the company.

A. L. MEYER, assistant manager of sales, Alan Wood Steel Co., Ivy Rock, Pa., has been appointed general manager of sales, succeeding WILLARD S. HARING, recently elected vice-president in charge of sales on the Pacific Coast. Mr. MEYER has been assistant sales manager for about one year and was for a number of years metallurgist of the company. WILLIAM H. DICKSON, who has been with the Alan Wood company for the past 21 years and for 10 years as Philadelphia district sales manager, has been appointed assistant manager of sales and will make his headquarters at Ivy Rock.

C. B. HOUCK, who for the past 35 years has been in charge of the operation of railroad and traction lines in and around Hazleton, Pa., has been elected president of the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. WILBERT WEAR, associated with Mr. Houck at Hazleton, has been elected treasurer and C. WILSON, JR., formerly general superintendent of the Harrisburg company, has been made vice-president and general superintendent. H. W. BISHOP, JR., continues as general sales manager and N. W. CASSELL is secretary in charge of purchases.

JACK L. HILTON has become manager of the Dalzell Brothers Co., Youngstown, engineer and fabricator, and will be assisted by H. L. DALZELL, sales engineer. Mr. Hilton was formerly manager of the plate fabricating department of the Commercial Shearing & Stamping Co., Youngstown.

ALFRED F. STENGEL has been appointed sales manager of the Tonawanda Iron Corporation, effective Jan. 15, having resigned his position with the Buffalo office of Semet-Solvay Co. The Tonawanda Iron Corporation will sell and distribute its pig iron direct. Sales offices will be located at North Tonawanda, N. Y. Mr. Stengel was associated with Rogers, Brown & Co., with headquarters at Buffalo, for more than 17 years, selling pig iron, coke and alloys and, when that com-



A. F. STENGEL

pany merged with Crocker Brothers, left to become vice-president of Waldo, Egbert & McClain. Later he was sales manager of the Mystic Iron Works at Boston.

FREDERICK E. GROSS, who has been in the pig iron business for the past seven years and recently resigned from the sales force of the Donner Steel Co., has become associated in a sales capacity with the Tonawanda Iron Corporation, North Tonawanda, N. Y.

M. W. DALLAS, who has been associated with E. C. Atkins & Co., Indianapolis, Ind., for the past five years, has been appointed advertising manager, succeeding the late Thomas A. Carroll.

JAMES CLEARY, who has been identified with the Combustion Engineering Corporation, New York, since 1921 in some of the branch offices of the company, has been made general sales manager.

ARTHUR C. PLETZ, heretofore assistant general sales manager of Pratt & Whitney Co., Hartford, Conn., has resigned to become works manager of the Aluminum Industries, Inc., Cincinnati.

FRANK A. FORD has been made western sales manager, with headquarters in the Chicago Daily News Building, Chicago, for John Bath &

Co., Worcester, Mass., manufacturer of ground taps, special machinery and precision tools. He will be assisted by PETER COLLINS, in Detroit, H. E. RICHMOND, in Michigan, L. T. BOHNET and E. G. DORAN, in Indiana, Illinois and Wisconsin.

HENRY MAAG, contract engineer for the H. K. Ferguson Co., Cleveland, engineer and builder, has been appointed manager of the new Chicago branch office recently opened by the company at 520 North Michigan Avenue, Chicago.

WALTER W. TANGEMAN, who has been associated with the Cincinnati Milling Machine Co. since 1909, has been elected vice-president of the company. He became a member of the organization while a student in the co-operative engineering department of the University of Cincinnati and for the past several years has been general sales manager. FREDERICK B. HEITKAMP, who has been assistant sales manager for several years, was promoted to general sales manager, succeeding Mr. Tangeman. Mr. Heitkamp was graduated from Rutgers University and came to the Milling Machine company in 1921.

C. R. CRANE, II, and A. F. GARTZ, JR., assistant vice-presidents, have been elected vice-presidents of the Crane Co., Chicago.

P. P. EVANS, heretofore vice-president of the Osborn Engineering Co., Cleveland, has been elected president.

G. MILTON LOPER has been appointed sales representative in the Philadelphia territory for Cox & Sons Co., Bridgeton, N. J., manufacturer of pipe cutting and threading machines, scrap bundling machines and stokers.

FRED T. NEBEL, who has been connected with the machine tool industry for 30 years, for the past nine years as treasurer of the Rahn-Larmon Co., Cincinnati, manufacturer of lathes, has been elected president of that company. B. J. LARMON is vice-president and OLIVER M. DOCK is secretary. These men, together with GEORGE S. LOTT and HORACE TODD, comprise the board of directors.

GUY L. BAYLEY, for some time head of the Chicago office of Sanderson & Porter, consulting engineers, New York, has been admitted into the firm.

EDWARD N. HURLEY, chairman of the Hurley Machine Co., Chicago, and former chairman of the United States Shipping Board during the World War, has been elected president of the American Manufacturers Export Association.

A. J. JOHNSTON, district manager at Chicago for Hickman, Williams & Co., has been elected a vice-president of the company and also named to the executive and financial commit-

tees. He has been associated with the company since he was graduated from the University of Wisconsin in 1913. J. H. ABBOTT, for a number of years in the sales department, has been made resident manager, with headquarters in the Chicago office.

BENJAMIN O'SHEA heretofore president of the Union Carbide Co. and of the Electro Metallurgical Co., both units of Union Carbide & Carbon Corporation, New York, has been elected chairman of the board of each company. FRED H. HAGGERTON, former vice-president, has been made president, and F. P. GORMELY has become vice-president and general manager of both companies.

J. T. HAGAN has been appointed general manager of sales of the J. M. & L. A. Osborn Co., Cleveland steel jobber, and JOHN J. KOCH, assistant sales manager. At the annual meeting, Jan. 23, HAROLD J. SMITH and WILLIAM B. OSBORN, were elected members of the board of directors to fill vacancies. A. W. HOWE, president and general manager, and other officers were re-elected.

Crawford Elected Jones & Laughlin President

George Gordon Crawford was elected president of the Jones & Laughlin Steel Corporation at a meeting of the directors of the corporation Jan. 28. He was also made a member of the board of directors and of the executive committee.

For about 28 years he has been president of the Tennessee Coal, Iron & Railroad Co., Birmingham, a subsidiary of the United States Steel Corporation. It is understood that he will assume his new duties in the immediate future.

Mr. Crawford is a native of Georgia and was graduated from the Georgia School of Technology in 1890 and then studied for two years at Karl-Eberhard University at Tübingen, Germany. He was assistant superintendent of the Edgar Thomson blast furnaces of the Carnegie Steel Co. from 1895 to 1897, superintendent of the blast furnace and steel works of the National Tube Co. at McKeesport for the next two years, and then superintendent of the Edgar Thomson blast furnaces for two years. He was manager of the tube works and plants of the National Tube Co., when he was transferred to Birmingham in 1907.

Ryding Becomes President of Tennessee Company

Herbert C. Ryding was appointed president of the Tennessee Coal, Iron & Railroad Co. at Birmingham on Jan. 28, succeeding George Gordon Crawford, who resigned, effective Jan. 31. Mr. Ryding has been vice-president in charge of operations of the Tennessee company since 1917, and has had many years of service with the corporation.

Obituary

PHILIP NORTH MOORE, mining engineer for 56 years and president of the American Institute of Mining and Metallurgical Engineers in 1917, died in a hospital in St. Louis on Jan. 20, aged 80 years. He was graduated from Miami University, Oxford, Ohio, and in 1872 received his master's degree in the School of Mines of Columbia University. During the following six years he was engaged as assistant in Geological Survey departments of various states, and in 1882 became manager and director of the Slate Creek Iron Co., Ala. From 1896 to 1916 he was president of the Rose Run Iron Co., in Kentucky. He was also active in various other mining companies. During the war he served in the engineering division of the National Research Council and after the war he served as a member of the War Minerals Relief Commission of the Department of the Interior.

BYRON E. VEATCH, vice-president of the Bell Lock Co., Chicago, died Jan. 23. He lived in Chicago for more than 30 years, going there from the West, where he spent his early manhood as a cowboy.

HOWARD E. CHICKERING, sales manager of Fairbanks, Morse & Co., Chicago, died Jan. 24, after a week's illness of heart disease. Mr. Chickering had been connected with Fairbanks, Morse & Co. for 30 years. He was transferred to Chicago headquarters about eight years ago.

CHARLES G. WADE, consulting engineer, widely known in Milwaukee, Kansas City and Denver, where he had practiced in past years, died at his home in Milwaukee, Jan. 19, aged 69 years. For the most part he had maintained his own offices but was at various times connected with Allis-Chalmers Mfg. Co. and the Falk Co.

ALBERT M. SEEBOOTH, secretary and manager of the Albert Seeboth Co., manufacturer of wiping waste, Milwaukee, died suddenly, Jan. 16, aged 45 years. His father, the late Michael Seeboth, founded the business and was a pioneer in that field.

J. H. PECKHAM, who had been a salesman in the Hartford, Conn., office of Henry Prentiss & Co., machine tool dealers, for over 10 years, died Jan. 22, from blood poisoning. Prior to his connection with Henry Prentiss & Co., he was, for many years, with the Norton Co., Worcester, Mass.

JOHN HALL, chairman of the board, Hall & Pickles, Ltd., iron and steel merchant of Manchester, England, died Jan. 26, aged 59. During the war he was attached to the Ministry of Munitions and controlled the production of all British steel works and rolling mills. He had been a member of the Iron and Steel Institute since 1898.

Book Reviews

(Continued from page 372)

ing press by an electrical motor weighing less than a hundred pounds.

The author thinks that the lack of commercial success was due to the fact that labor-saving devices were of little interest a hundred years ago. It seems more probable that the chief difficulty was that the motor was ready before there was any electricity to run it, save from the expensive zinc batteries. As a matter of fact, most historical notes about early electrical machines relate to generators, or means of changing steam or water power into electricity, rather than the change of electricity into mechanical energy. It may have occurred to Davenport and his associates that they could generate electricity with their motor by driving it backward, so to speak, but if it did they rejected the plan of driving one electrical machine by another prime mover, merely to enable them to do with a second electrical machine that which could readily be done by steam or water power direct.

The book is a plain tale of a plain New Englander who was far ahead of his time, only in Davenport's case there is no happy ending to the story.

E. E. T.

Handbook of Market Data

Market Data Handbook of United States. By Paul W. Stewart. 534 pages, 9 x 11½ in., with five maps of trading areas. Government Printing Office (Superintendent of Documents), Washington. Price \$2.50.

To any manufacturer planning a nation-wide advertising campaign, to any sales manager fixing quotas and territories for his representatives, to any executive analyzing sales and distribution expenses in various regional outlets, this book will appeal. An enormous amount of material from governmental and private sources has been systematized and presented in such detail that it can be regrouped by any statistician into units shedding light on almost any marketing problem. Much of the information is presented for the first time. It comprises data for every county of the Union on population, income, manufacturing activities, wealth (bank deposits and automobile registration), newspaper and magazine circulation, number and size of farms, and number of electric and telephone customers—to mention none but the principal headings.

Consequently, the information will be valuable for appraising the market possibilities for the sale of industrial equipment as well as general consumption goods. Each problem in market measurement will require a different collation of the data here presented, but four large maps of the United States are included which will give immediate, if only approximate, answers to many questions, viz., wholesale grocery trade areas, areas of daily and Sunday newspaper circulation, retail trade areas, and trade areas for budgetary control.

E. E. T.

A Pair of Chemical Dictionaries

A Chemical Dictionary. By I. W. D. Hackh. 790 pages, 6½ x 10 in., illustrated. P. Blakiston's Sons & Co., Inc., Philadelphia. Price \$10.

This book is a desirable reference work for the metallurgist and chemist. It offers certain advantages, since it is the only recent American edition of a chemical dictionary, and consists of but one volume as compared with the several of its English competitors. The general arrangement, two columns of clear type to a page, and the interesting makeup, including cuts of leading men of science, tables and charts (in many cases reproduced from original drawings), have proved of general interest and promote easy reference.

The scope is very broad and subjects are covered neces-

sarily briefly, but enough information can be secured rapidly by a busy executive to serve his purpose in many instances. For the laboratory man enough details are shown to assist him to verify the matter in textbooks or standard works on the metallurgical or chemical industry.

MARSHALL S. WALKER.

Gmelin's Handbuch der anorganischen Chemie. 224 pages, 6¾ x 10 in. Published by the German Chemical Society, Berlin. Price 33 marks. (Subscription price 26 marks.)

Part "A" of the new Gmelin on iron will be of general interest to metallurgists, while Part "B" will be more of interest to chemists. The first number of Part "A" contains 224 pages and, as might be expected, is both comprehensive and thorough, with an immense amount of information. Beginning with a valuable historical bibliography, the next 125 pages cover the geology and mineralogy of iron, including some production and consumption statistics of various countries. Electrolytic and chemical methods of producing pure iron are next discussed, with a brief account of the uses of electrolytic iron. Some special forms of iron are also described.

This number will be very valuable as reference for the items covered, while the extensive bibliographical references will simplify the quest for more complete information.

SAMUEL L. HOYT.

Foundry Accounting, as Done in Germany

Die Betriebspraxis der Eisen-Stahl-und Metallgiesserei. By Hubert Hermanns. Published by Wilhelm Knapp, Halle, Germany. 96 pages, 6½ x 9¼ in., 38 forms, 13 diagrams. Price 5.40 marks.

This formidable title refers to cost accounting with especial reference to foundry practice. The book is valuable because it gives many concrete examples of the influence of some forty-two processes involved in making a casting. "Overhead" is discussed in detail, but the assumption that the average foundryman—either German or American—can apply algebraical formulas to its distribution, is unwarranted.

Nine accounts are recommended by the author, whereas in extensive American foundries four times that many are common. The graphic curves given to supplement or explain the tables or the algebraic equations are clear; and for most persons necessary. Of course, each plant must make its own curves to apply to the factors existing in that particular organization, and these must be revised as conditions change. Such skeleton tables and curves, to be completed from time to time by subsequent experience and by calculated interpolation, are especially valuable in cost estimating—a far more difficult operation than cost accounting.

ROBERT GRIMSHAW.

Notes on New Books

Engineering Drawing. By Thomas E. French. Fourth edition, 466 pages, 6 x 9 in., illustrated. McGraw-Hill Book Co., New York. Price \$3.

This widely-used manual for engineering students and draftsmen has been revised to conform to several of the standards sponsored by the American Standards Association such as screw threads, bolts and nuts, cap screws, keys, screwed and flanged pipe fittings, rivets, tapers, symbols and drafting room practice. The expanded number of problems has been increased from 76 to 120, and include new automotive, airplane and electrical problems.

Abstracts of articles on the fatigue of metals under repeated stress which have appeared in the technical press from July 1, 1928, to June 30, 1929, have been prepared by the research committee on fatigue of metals of the Ameri-

can Society for Testing Materials and published in pamphlet form. The abstracts cover 27 pages.

The 12 papers which constituted a "Symposium on the Physical Properties of Cast Iron," held by the American Society for Testing Materials at its annual convention in June, 1929, in Atlantic City, have been published in pamphlet form by the society. The discussion which developed is also included, as well as the report of sub-committees of committee A-3 on correlation of test bar and casting and on the heat treatment of cast iron. The pamphlet contains 118 pages and is well illustrated.

Wholesale prices from 1913 to 1928 are covered in tabular form, with diagrams, in Bulletin 493 of the United States Bureau of Labor Statistics. This bulletin runs more than 260 pages and contains a large amount of information about several hundreds of items. In general, data are given monthly for 1927 and 1928, accompanied by yearly averages for each year from 1913 to 1928 inclusive.

Retail prices from 1890 to 1928 are covered in Bulletin 495 of the United States Bureau of Labor Statistics, which runs to 220 pages. The book covers primarily foods, coal, gas and electricity, together with purchasing power of union wages and comparison of retail price changes in foreign countries.

Two notable volumes of commercial data appear almost simultaneously. One is "Mechanical Catalogue" published by the American Society of Mechanical Engineers, New York, and the other is "Chemical Engineering Catalogue" published by Chemical Catalogue Co., New York, supervised by a committee appointed by prominent organizations of chemists. Each of them is the latest of over a dozen annual issues, and catalogues in uniform manner the equipment, machinery, and supplies consumed or produced by the prominent firms in the respective industries. In both volumes it is apparent that a consistent and successful effort has been made to present data on sizes and performance which will enable a prospective purchaser to select the most adequate article for his especial purposes, and to suppress the generalities found in most advertising pages. In other words the books are worthy of their names "catalogues" and not merely collections of advertisements. Extensive cross indexes enhance the usefulness of the volumes.

Proceedings of the Second National Conference on Merchant Marine, which was held under the auspices of the United States Shipping Board, in Washington, in January, have been published in a book of 201 pages. One of the most important discussions contained in the book is on the greater cost of manufacture of ships in the United States, compared with costs in Europe and Japan. Differentials were reported as high as 60 or 65 per cent in some cases, and rarely under 33 per cent. This subject has been discussed for years, and many futile efforts have been made to overcome the differential, through subsidies to American marine ships or by other means. As H. G. Smith, vice-president, Bethlehem Shipbuilding Corporation, put it: "A large differential . . . has always existed in connection with building steel vessels, and always will exist as long as living conditions in the United States are on a higher plane than those abroad."

Engineering achievements in the electrical industry are covered in a recent special publication of the Westinghouse Electric & Mfg. Co., East Pittsburgh. A number of interesting illustrations in the steel industry are included, as well as various other methods of electrical utilization.

More than 600 gray iron foundries submitted data to the United States Department of Commerce in response to a questionnaire regarding their operations. Foundries producing castings for their own use operated at 55 per cent in the two years from July 1, 1925, compared with

only 43 per cent for jobbing foundries and 46 per cent for those producing both for sale and for their own use. This and other data secured is published by the Bureau of Foreign and Domestic Commerce in a 60-page pamphlet, which is illustrated by numerous diagrams showing how the operations varied according to section of the country, size of the plant, weight of individual castings and other individual features. Efficiency of operation as measured by the number of molders employed for certain units of output was one feature of the study.

"Statistical Abstract of the United States" for 1929 has just been published by the Department of Commerce (E. D. Durand, chief of division of statistical research) and is obtainable from the Superintendent of Documents for \$1. It contains a digest of data accumulated during the fiscal year by all statistical agencies of the Government, as well as several cooperating private and state organizations. Its 849 pages contain 833 tables of data on health, education, finance, utilities, commerce, agriculture, mining and manufacturing. In all instances the figures are given without comment or interpretation, except to show parallel columns of data for former years.

A fourth edition of "Hütte's Iron and Steel Handbook (Taschenbuch für Eisenhüttenleute) has been published by Wilhelm Ernst & Sohn, Berlin, Germany, leather bound at 38 marks. In addition to a critical revision of the 1922 edition, the present 968-page volume includes new matter on heat treatment, cutting tools, welding, and forging. A cursory inspection impresses one with the comprehensiveness and accuracy of the book; however, it is sadly deteriorated from the pre-war quality of paper, presswork and binding.

New Books Received

Hand-to-Mouth Buying. By Leverett S. Lyon. 487 pages, 5½ x 7½ in., illustrated. Brookings Institution, 26 Jackson Place, Washington. Price \$4.

Steel Treating Practice. By Ralph H. Sherry. 399 pages, 6 x 9¾ in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York. Price \$4.

Railroad Purchasing and the Business Cycle. By John E. Partington. 309 pages, 6¼ x 9¼ in., illustrated. Brookings Institution. Price \$3.

The Manufacture of Chilled Iron Rolls. By Archibald Allison. 112 pages, 5½ x 8¾ in., illustrated. Isaac Pitman & Sons, 2 West Forty-fifth Street, New York. Price \$2.50.

Wage Incentive Methods. By Charles Walter Lytle. 457 pages, 6 x 8½ in., illustrated. Ronald Press Co., 15 East Twenty-sixth Street, New York. Price \$7.50.

Materials Handling Equipment. By Edward J. Tournier. 371 pages, 6 x 9¾ in., illustrated. McGraw-Hill Book Co. Price \$4.

Earnings in Standard Machine Tool Occupations in Philadelphia. By H. Larue Frain. 85 pages, 6 x 9¾ in. University of Pennsylvania Press, Philadelphia. Price \$1.50.

Conditional Sales. By Roger Sherman Hoar. 521 pages, 6 x 8¾ in. Ronald Press Co. Price \$10.

Official Proceedings of the Twenty-ninth Convention of the International Acetylene Association. 289 pages, 6¾ x 9½ in., illustrated. International Acetylene Association, 17 East Forty-second Street, New York.

A Picture of World Economic Conditions in the Summer of 1929. 309 pages, 6¼ x 9¾ in. National Industrial Conference Board, 247 Park Avenue, New York. Price \$2.50.

Year's Exports Highest Since 1920

Drop in December in Both Exports and Imports—Most of Export Gain Was in Finished, Rolled Products, in Which Imports Declined

WASHINGTON, Jan. 25.—While exports of iron and steel products from the United States declined to 215,242 gross tons in December, the smallest monthly outgoing movement since April, 1928, with a total of 215,183 tons, the aggregate for last year was 3,032,352 tons, the highest since 1920. That year had a total of 4,927,800 tons. Last year also was 167,249 tons in excess of 1928 exports. The December exports were 26,587 tons under those of 241,829 tons in November, and 6949 tons less than the 222,191 tons in December, 1928.

Imports in December, amounting to 47,486 tons, were the smallest monthly incoming shipments since November, 1924, with a total of

35,707 tons. For the year they were 739,004 tons, the smallest movement for any 12-month period since 1924, with a total of 556,814 tons. Receipts in December were 6555 tons less than those of November, 54,041 tons, and for the year 1929 they declined 43,668 tons from the preceding year's 782,672 tons. Imports in December, 1928, were 55,362 tons.

The principal gains in exports last year when compared with those of 1928 were in scrap, steel bars, plates, plain structural material, fabricated material and black and galvanized welded pipe. The more important losses were reflected in exports of pig iron and steel rails. The greater decreases in December when compared

with November of last year were made in ingots and blooms, skelp, plates, and plain and fabricated structural material. Gains were made in substantial quantities in galvanized sheets, tin plate and black and galvanized welded pipe.

The heaviest loss in imports in 1929 when compared with the previous year was in steel bars, which dropped to 38,219 tons, from 85,348 tons, while other important decreases were made in hoops, bands and cotton ties, structural shapes and cast iron pipe. Sizable increases were made in ferromanganese and scrap, with some fair gains in a few finished lines. The greatest loss in December when compared with November was in struc-

Exports of Iron and Steel from the United States

(In Gross Tons)

	December		12 Months Ended December	
	1929	1928	1929	1928
Pig iron	1,618	8,414	46,352	84,682
Ferromanganese	83	582	1,574	9,440
Scrap	56,473	36,308	552,372	516,139
<i>Pig iron, ferroalloys and scrap</i>	<i>58,174</i>	<i>45,304</i>	<i>600,298</i>	<i>610,261</i>
Ingots, blooms, billets, sheet bar	784	1,626	45,578	30,109
Skelp	1,636	3,886	130,975	131,754
Wire rods	3,056	2,830	42,250	38,617
<i>Semi-finished steel</i>	<i>5,476</i>	<i>8,412</i>	<i>218,803</i>	<i>200,472</i>
Steel bars	8,268	14,937	190,023	158,475
Alloy steel bars	1,377	707	15,744	14,079
Iron bars	221	1,187	4,074	6,229
Plates, iron and steel	11,305	18,736	193,695	166,269
Sheets, galvanized	12,078	12,759	154,533	152,280
Sheets, black steel	9,365	12,766	170,782	179,286
Sheets, black iron	1,205	1,454	15,955	16,289
Hoops, bands, strip steel	5,207	6,612	70,753	58,080
Tin plate; terne plate	24,522	17,307	258,965	249,642
Structural shapes, plain material	14,841	17,086	273,096	202,804
Structural material, fabricated	5,848	9,549	112,235	92,758
Steel rails	10,034	12,114	149,234	190,905
Rail fastenings, switches, frogs, etc.	2,954	3,240	32,614	41,995
Boiler tubes	1,918	1,392	19,473	18,749
Casting and oil line pipe	6,983	7,871	117,025	119,785
Black and galvanized pipe	15,278	7,122	145,937	110,361
Plain wire	3,275	3,581	45,629	46,177
Barbed wire and woven wire fencing	4,397	5,371	64,463	74,335
Wire cloth and screening	113	203	1,692	1,884
Wire rope	375	610	6,959	5,367
Wire nails	806	1,007	12,887	14,547
Other nails and tacks	642	879	10,256	9,892
Horseshoes	9	48	440	468
Bolts, nuts, rivets and washers, except track	1,479	857	16,235	13,278
<i>Rolled and finished steel</i>	<i>142,500</i>	<i>157,395</i>	<i>2,082,699</i>	<i>1,943,934</i>
Cast iron pipe and fittings	3,610	2,813	45,761	33,979
Car wheels and axles	1,177	2,569	21,460	17,139
Malleable iron screwed fittings	1,232	959	12,514	10,034
Iron castings	697	1,695	10,976	12,061
Steel castings	503	1,129	10,824	9,710
Forgings	710	821	12,097	11,703
<i>Castings and forgings</i>	<i>7,929</i>	<i>9,986</i>	<i>118,632</i>	<i>94,626</i>
All other	1,163	1,164	16,920	15,810
Total	215,242	222,191	3,032,352	2,865,103

Imports of Iron and Steel into the United States

(In Gross Tons)

	December		12 Months Ended December	
	1929	1928	1929	1928
Pig iron	17,172	10,825	147,763	140,644
Ferromanganese*	3,229	3,277	62,645	47,170
Ferrochrome†	48	48	645	707
Ferrosilicon‡	453	946	9,426	4,456
Scrap	1,759	6,548	90,464	63,314
<i>Pig iron, ferroalloys and scrap</i>	<i>22,661</i>	<i>21,644</i>	<i>310,943</i>	<i>256,291</i>
Steel ingots, blooms, billets, and slabs	1,705	1,218	26,494	21,441
Wire rods	1,039	4,328	15,653	19,298
<i>Semi-finished steel</i>	<i>2,744</i>	<i>5,546</i>	<i>42,147</i>	<i>40,739</i>
Rails and splice bars	199	684	6,586	15,175
Structural shapes	8,243	10,100	148,156	163,761
Boiler and other plates .....	...	107	3,243	8,025
Sheets and saw plates	2,540	1,264	25,218	22,774
Steel bars	2,805	3,224	38,219	85,348
Bar iron	319	109	2,932	2,444
Hoops, bands and cotton ties	1,563	1,645	42,146	51,785
Tubular products (wrot.)	3,020	4,404	40,521	45,495
Nails, tacks, staples	740	799	9,130	10,136
Tin plate	19	51	286	922
Bolts, nuts, rivets and washers	74	51	429	278
Round iron and steel wire	476	443	5,825	4,702
Barbed wire	544	831	5,999	5,635
Flat wire; strip steel	154	256	2,175	2,563
Steel telegraph and telephone wire .....	...	...	26	173
Wire rope and strand	222	157	2,549	1,676
Other wire	63	90	498	774
<i>Rolled and finished steel</i>	<i>20,981</i>	<i>24,215</i>	<i>333,938</i>	<i>421,666</i>
Cast iron pipe	975	3,529	50,074	60,794
Castings and forgings	125	428	1,902	3,182
Total	47,486	55,362	739,004	782,672
Manganese ore*	15,302	20,365	323,935	308,594
Iron ore	286,055	204,799	3,139,334	2,620,717
Magnesite (dead burned)	1,458	4,310	45,675	44,976

*Manganese content only.

†Chromium content only.

‡Silicon content only.

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS (In Gross Tons)			
	Dec.	Nov.	Oct.
Austria	45	1	89
Belgium	7,458	10,410	11,374
Czechoslovakia	31	53	38
France	2,871	4,768	6,272
Germany	9,470	9,218	8,400
Italy	96	601	393
Netherlands	3,833	675	585
Norway	1,125	1,408	4,294
Sweden	2,864	4,043	2,810
Switzerland	5	4	30
United Kingdom	7,461	6,473	1,950
Europe	35,259	37,659	36,226
Canada	3,426	9,010	18,082
Mexico . . . . .	...	...	60
Panama . . . . .	...	41	...
Cuba	228	...	...
British India	8,798	7,053	8,346
China . . . . .	...	44	...
Hongkong	1	...	...
Japan	2	6	2
Miscellaneous . . . . .	...	5	1
Total	47,486	54,041	63,226

tural shapes, which declined to 8243 tons from 11,961 tons.

Of the exports in 1929, Canada took 1,227,544 tons, or 40.8 per cent of the total, against 1,178,063 tons, or 41.1 per cent of the 1928 total. In December, exports to Canada were 61,093 tons, a sharp drop under the 102,524 tons shipped to that country in November. Exports to Japan in 1929 were 427,755 tons, or 14.2 per cent of the total, compared with 411,754 tons, or 14.3 per cent of the 1928 total. Exports to Japan in December rose to 54,839 tons from 42,550 tons in November, and were but 6754 tons under the tonnage shipped to Canada, invariably the leading consumer of American exports.

Germany led as the source of imports in December, providing 9470 tons, while shipments from India, totaling 8798 tons, made up of pig iron, gave second rank to the latter country. The United Kingdom supplied 7461 tons and Belgium 7458 tons.

The largest item of exportation in both December and the year 1929 was scrap, the shipments being 56,473

tons and 552,372 tons, respectively. Scrap was shipped in December largely to Japan, 41,218 tons; Italy, 5602 tons; and Canada, 5498 tons. The largest exports of finished lines last year were in plain structural shapes, 273,096 tons, of which 230,048 tons went to Canada, which, in December, took 12,440 tons. Exports of plain material to Japan last year were 9346 tons, a sharp gain over the 2387 tons for the previous year.

Tin plate constituted the next most important item of exportation last year, the total being 258,965 tons, while the December exports of 24,522 tons represented the largest outgoing movement in rolled products. Japan led as the foreign market for American tin plate in both December and the year, taking 5143 tons and 61,814 tons, respectively. Canada was second, taking 3681 tons and 46,213 tons.

Of the 10,240 tons of black welded pipe exported in December, 2349 tons went to Mexico and 2270 tons to Soviet Russia. Of the 5038 tons of galvanized welded pipe exported during that month, 1536 tons went to Venezuela and 917 tons to Argentina. Venezuela took 2633 tons of the 6983 tons of casing and oil line pipe exported, while Argentina took 969 tons and Mexico 521 tons.

Of the 8243 tons of shapes imported in December, 4674 tons came from Belgium, 2424 tons from Germany and 1002 tons from France. Sweden supplied 1377 tons of the 2805 tons of steel bars imported, while 560 tons came from Belgium, 473 tons from Germany and 173 tons from France.

Of the 3229 tons of ferromanganese imported in December, 1678 tons came from the United Kingdom, 817 tons from Norway and 734 tons from Canada. Brazil supplied 9392 tons of the 15,302 tons of manganese concentrates imported during the month, while 2860 tons came from India, 2800 tons from the Gold Coast of Africa and 247 tons from Soviet Russia.

ther above the imports for December, 1928, at 10,825 tons.

For the twelve months the total of 147,763 tons is about 5 per cent greater than the 140,644 tons of 1928. Both figures are less than one-third the incoming movement in 1926 and scarcely more than one-third that of 1925.

For the year the contribution of

India has been slightly less than one-half the total, with United Kingdom, Netherlands and Canada following in that order, but some distance lower. In 1928 both Sweden and Norway were ahead of Canada, but otherwise the order was the same.

Japanese Pig Iron Buyers and Sellers Agree

YOKOHAMA, JAPAN, Dec. 30.—The Sentetsu-Kyodo-Kumiai, an association recently formed by pig iron buyers, has made an agreement with producers in Japan to buy domestically, except for about one-third of their requirements, representing grades not made by Japanese furnaces. The agreement is to be effective for a period of three years, beginning Sept. 1, 1930. A provisional arrangement has been made on the same terms, effective from April 1 to Sept. 1.

German Plant to Make Steel from Sponge Iron

HAMBURG, GERMANY, Jan. 13.—The first steel to be produced in Germany from sponge iron will be made late in February when the Eisenschwammgesellschaft G.m.b.H., Bochum, begins operation. The plant will operate under Norwegian patents and is designed for an annual output of about 30,000 tons of steel. It is controlled by the Friedrich Krupp A.G., Essen, the Vereinigte Stahlwerke, A.G., Düsseldorf, and the German Dye Stuff Corporation.

All-Steel Zeppelin Hangar at Friedrichshafen

HAMBURG, GERMANY, Jan. 13.—A new Zeppelin hall at Friedrichshafen, of all-steel construction, has just been completed by the Gutehoffnungshütte, Oberhausen. The new hangar, which will house a new Zeppelin, the Z-129, which will have 50 per cent more volume than the Graf Zeppelin, is 250 m. long, 50 m. wide and has a 46 m. ceiling. (820 ft., 164 ft., 151 ft.) The latest dirigible will be started in February or March and plans call for completion in 16 to 18 months.

World Power Conference in Berlin in June

The second World Power Congress will be held at Berlin, Germany, June 16 to 25. An American committee has been formed, with O. C. Merrill, Edmonds Building, Washington, as chairman, to care for an American delegation, for which the steamship Resolute of the Hamburg-American Line has been engaged, sailing from New York on June 4. The tour from the United States will be under the management of the American Express Co., and will cover hotel arrangements in Berlin, where 4000 to 5000 are expected to be in attendance at the conference. For the conference itself the American committee will present a total of 63 papers.

Pig Iron Imports Higher in December

Incoming shipments of pig iron in December are reported by the United States Department of Commerce at 17,172 gross tons. This is an increase of about one-third over the November total of 12,702 tons, and is still fur-

UNITED STATES IMPORTS OF PIG IRON BY COUNTRIES OF SHIPMENT

	(In Gross Tons)		12 Months Ended December	
	December	1929	1928	1929
India	8,798	5,324	68,968	56,426
United Kingdom	4,002	2,190	39,140	49,694
Germany . . . . .	...	300	103	695
France . . . . .	...	...	101	320
Netherlands	3,760	2,323	24,189	26,989
Sweden	260	199	3,534	2,524
Norway	307	100	3,400	1,186
Canada	45	352	7,382	1,015
Belgium . . . . .	...	...	284	222
All others . . . . .	...	37	662	1,569
Total	17,172	10,825	147,763	140,644

Price Maintenance in Foreign Markets

British Pig Iron and Japanese Black Sheets Hold Up or Advance—

Cartel vs. American Exports—Scrap More Active on Continent

(By Cable)

LONDON, ENGLAND, Jan. 28.

FUEL is cheaper, but pig iron producers are maintaining prices, claiming that there is still insufficient profit. Consumers continue to delay buying, so that business is only moderate.

Dorman, Long & Co. are closing the Carlton Iron Works where one blast furnace is operating on ferromanganese. Production is to be concentrated at the South Bank works.

Hematite makers are well sold for forward delivery, but premiums are no longer obtainable for prompt shipment. Mixed numbers have been offered down to £3 18s. (\$19.03) per ton.

Finished iron and steel markets are dull, especially for export, but domestic consumers are supplying their regular specifications and works are consequently fairly well engaged.

Tin plate is quiet, consumers being influenced by the poor tin market. Makers, however, are well sold and not pressing for business. Mills outside the association have accepted 18s. 7½d. (\$4.54) per base box, but other makers are adhering to 18s. 9d. (\$4.57) per base box, f.o.b. works port.

Galvanized sheets are weak on continued lack of substantial demand. Black sheets continue quiet.

The National Federation of Iron and Steel Manufacturers has addressed a letter to the Government protesting against the Government's proposed amendments to the coal

mines bill relating to compulsory consolidations. The letter states that to be successful amalgamations must be the natural result of a community of interests of the companies concerned and should not be enforced by statute. The coal bill will increase fuel costs and the federation believes that it will hinder a general industrial recovery.

Marshall Sons & Co., agricultural and general engineers of Gainsborough, are acquiring Clayton & Shuttleworth, Ltd., of Lincoln, under the rationalization plan.

Continental markets are inactive, sellers endeavoring to obtain the prices fixed by the cartel, but buyers are uncertain of their firmness.

The International Steel Cartel is reported to have decided definitely to establish central selling offices for six months, beginning Feb. 1. It has further been proposed that the various national syndicates quote c.i.f. prices instead of f.o.b. prices for export.

German output in December was 1,156,000 metric tons of raw steel and 802,000 tons of rolled products. Luxembourg output was 245,000 tons of pig iron and 217,000 tons of raw steel. Belgian output was 340,000 tons of pig iron, 312,000 tons of raw steel and 284,000 tons of rolled products. Saar output was 173,000 tons of pig iron, 168,000 tons of raw steel and 170,000 tons of rolled steel products.

Does Not Endanger American Exports

Cartel Controls 1,000,000 Tons of Steel Monthly—Wire, Sheets and Tin Plate Not Included

HAMBURG, GERMANY, Jan. 13.—Comments in the press to the effect that the International Steel Cartel, as a selling organization, will provide severe competition for American steel mills is rather generally discounted by members of the syndicate.

It is agreed that the new organization will afford a means of fostering export trade and will control prices and conditions of contracts. The cartel will have available for export about 1,000,000 tons of steel products

a month and will have a virtual monopoly of certain products. But it is pointed out by steel mills here that serious competition with American mills is not at all likely, since most exports from the United States are to markets where there is a decided preference for American material and specifications, such as Canada and Central and South American countries, which politically favor trade with the United States. The larger part of the production exported by

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.88

British Prices f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3 12½s.	to £3 13⅓s.	\$17.69	to \$17.93
East Coast hematite	3 18	to 4 0	19.03	to 19.52
Ferromanganese, export	12 5	to 12 15	59.42	to 62.22
Billets, open-hearth	6 2½	to 6 12½	29.89	to 32.33
Sheet bars, open-hearth	5 17½	to 6 5	28.67	to 30.50
Black sheets, Japanese specifications	12 10		61.00	
Tin plate, per base box	0 18%	to 0 18½	4.48	to 4.51
Rails, 60 lb. and heavier	7 15	to 8 15	37.59	to 42.43
Steel bars, open-hearth	8 0	to 8 10	1.74	to 1.85
Beams, open-hearth	7 7½	to 7 17½	1.60	to 1.72
Channels, open-hearth	7 12½	to 8 12½	1.66	to 1.91
Angles, open-hearth	7 7½	to 7 17½	1.60	to 1.72
Ship plates, open-hearth	7 15	to 8 5	1.69	to 1.79
Black sheets, No. 24 gage	9 15	to 10 0	2.12	to 2.18
Galvanized sheets, No. 24 gage	11 15	to 12 0	2.56	to 2.57

Sheet bars, Thomas	4 11	to 4 13	* 22.20	to 22.69
Wire rods, low C., No. 5 B.W.G.	6 2	to 6 4	29.77	to 30.26
Rails, 60 lb. and heavier	6 8½	to 6 10*	31.35	to 31.72
Rails, light	6 0		29.28	
Steel bars, merchant	5 5	to 5 6	1.14	to 1.15
Steel bars, deformed	5 3	to 5 5	1.12	to 1.14
Beams, Thomas, British standard	5 0	to 5 4	1.09	to 1.13
Channels, Thomas, American sections	5 12	to 5 14	1.22	to 1.24
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 0	to 5 6	1.09	to 1.15
Angles, Thomas, 3-in.	5 6		1.14	
Ship plates, open-hearth inspected	7 2	to 7 5	1.55	to 1.58
Black sheets, No. 31 gage, Japanese	12 1	to 12 4	2.61	to 2.66
Hoop and strip steel over 6-in. base	5 11½	to 5 12½	1.21	to 1.22
Wire, plain, No. 8 gage	7 0		1.52	
Wire, galvanized, No. 8 gage	8 9		1.83	
Wire, barbed, 4-pt. No. 12 B.W.G.	11 1½		2.41	
Wire nails, base	0 6½		\$1.55	per keg
Wire nails, assortments 1 to 6-in. keg	10 6½		2.69	

*Open-hearth steel, 8s. (\$1.94) per ton extra.

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3 7s.	to £3 11½s.	\$16.35	to \$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3 5	to 3 6	15.86	to 16.11
Billets, Thomas	4 11	to 4 12½	22.20	to 22.57

the cartel will be Thomas grade steel rolled to the usual Continental specifications, while mills in the United States will be furnishing open-hearth steel and American specifications.

The only products in which there might conceivably be severe competition, it is claimed, are rails and tubular products, both of which are controlled by separate international cartels, of which the American producers are members. Tin plate, of which the United States exports a considerable tonnage, is already being handled through the Welsh-American agreement and the Continental exports do not exceed 5 per cent of the total Welsh and American exports of this

product. Neither wire products nor sheets, a fair tonnage of which is exported by the United States, are controlled by the cartel.

The two products in which severe competition might develop are wire rods, in Japan, and cold-rolled hoops, in the Far Eastern and certain South American markets. However, available export tonnage in these two products represents only about 0.6 per cent of total Continental exports and 1.5 to 2 per cent of American steel exports. Furthermore, members of the International Steel Cartel point out, the object of their selling organization is to seek a more profitable price on export business.

prevailing in the French and Belgian coal and steel industries. Expansion and modernization of plants in the steel industry also influenced renewal of the syndicates, as large sums have been spent and further financing is necessary, which would have been difficult to obtain in a disorganized and unprofitable steel market.

The Vereinigte Stahlwerke A. G., Düsseldorf, recently acquired a number of small steel producers and will close some of the plants, according to report. Similar action is being taken in the coal industry, a leading coal corporation controlled by the Vereinigte Stahlwerke A. G. having acquired a majority interest in the Essen Steinkohlenbergwerke, which has a quota of 5,500,000 tons in the Ruhr Coal Syndicate.

Japanese Advance Black Sheets

Kawasaki Dock Yard Raises Price for Delivery This Year— Japan Supplying More of Its Own Needs

YOKOHAMA, JAPAN, Dec. 30.—Quotations on light-gage black sheets by the Kawasaki Dock Yard Co. for January-February delivery are 2 to 3 yen (\$0.98 to \$1.47) a ton higher than previously. On 18 sheets to the bundle the price is 172 yen (\$84.49) a ton, delivered, and on 12 sheets to the bundle, 160 yen (\$78.59) per ton, delivered.

Imports of black sheets in 1929 are estimated to have been not much more than 100,000 tons, the smallest total for a number of years. The increased output of the Kawasaki Dock Yard Co. is undoubtedly responsible for the curtailment of importation. Prices in 1929 advanced from 191.50 yen in January to 193 yen in May, after which a steady decline brought the market to 170 yen (\$83.49) per ton in late December.

German mills producing light-gage black sheets have been improving the quality of their product, and certain Japanese consumers, who have tested

recent importations, report the quality to be almost on a par with the best British brands. Offering this quality of light-gage sheet, the German sellers are quoting £13 10s. (\$65.88) per ton, c.i.f. Japanese port, for January-February delivery.

Japan's growing ability to supply its own requirements in black sheets is shown by a comparison of total imports from 1923 to 1929. From 179,358 metric tons imported in 1923, the peak was reached in 1924 with a total of 344,131 tons. In 1925 imports were only 120,878 tons; in 1926, 187,681 tons; in 1927, 176,417 tons; in 1928, 183,872 tons. Recently new rolling mills at the Kawasaki Dock Yard Co. brought the capacity of the company to 185,000 tons of sheets a year and for 10 months of 1929 imports reached only 79,332 tons. In this same period, sheet prices declined from an average in 1923 of £22 1s 3d. per ton, c.i.f. Japanese port to £14 5s. per ton, c.i.f., in 1929.

Domestic Steel Trade Quiet in Germany Cartel Price Control Spurs Export Business—Aluminum Tariff May Bring Rebates to Exporting Manufacturers

BERLIN, GERMANY, Jan. 7.—The pig iron market has been quiet as a result of inactivity in foundries and machine shops during the holidays, and export sales have been small. Iron and steel prices are generally unchanged and the domestic steel market is quiet. Export sales of steel bars have increased as a result of plans by the International Steel Cartel to fix prices, probably at a higher level, and there has been increased buying of semi-finished steel by overseas consumers.

According to an estimate made by the Association of German Iron and Steel Industrials, world production of pig iron was about 97,000,000 metric

tons, of which Germany produced 13,200,000 tons, and world output of steel ingots was 123,000,000 metric tons, of which Germany's share was 16,300,000 metric tons.

Financing Required Syndicate Renewals

Renewal of the domestic steel syndicates has met with general approval. Labor supported the renewals, conceding that failure of the syndicates would have resulted in a price decline in the domestic market, followed by efforts to reduce wages. A recent report of the Ruhr Chamber of Commerce advocated reduction of German wages to a level with those

Price Rebates on Aluminum

The expected duties of 250 m. (\$59.55) per metric ton on aluminum ingots, 120 to 370 m. (\$28.58 to \$88.13) on semi-finished aluminum products and 200 m. (\$47.64) per ton on aluminum scrap are understood to have been based on an agreement made by the producers with manufacturers of aluminum wares, under which export rebates will be granted, as in the steel industry. Under this agreement manufacturers for export would receive the difference between the domestic and world market price of aluminum.

Referring to the aluminum tariff, the *Deutsche Economist* says: "It is doubtful whether the new import duties will really have the effect desired by the producing companies—of keeping American aluminum out of the German market. If the American corporation finds itself compelled, after expansion of its plant, to sell an enormous surplus, we believe that it will accept the financial sacrifice, in spite of the German duty. The duty may, therefore, hamper American competition in the German market, but will not prevent it."

German and Belgian Scrap Markets Active

HAMBURG, GERMANY, Jan. 13.—Scrap is increasingly active in Germany and Belgium, although the important scrap importing markets of Poland, Czechoslovakia and Italy are decidedly quiet. A fair tonnage of American scrap has accumulated at the ports of Danzig and Genoa, with consumers slow to accept deliveries. Improvement in demand is not expected until about the end of February.

Japan Exports Wire

YOKOHAMA, JAPAN, Jan. 2.—Exports of galvanized wire to China are increasing and wire mills here expect to develop a considerable trade with Chinese consumers as well as other overseas markets, having in mind the heavy volume of galvanized sheet business developed in the past few years.

New High Record in Machinery Exports

Year's Total 24 Per Cent Above 1928—Imports Gained 37½ Per Cent—Agricultural Machinery in New Record

WASHINGTON, Jan. 25.—Exports of machinery of all kinds from the United States in 1929 aggregated a value of \$612,735,771, an increase of \$116,451,181 or 24 per cent over those of 1928, valued at \$496,283,961, and much the highest total ever reached. Those of last December were valued at \$49,583,781, a gain of \$2,042,200 over November, valued at \$47,541,581, and of \$5,489,376 over December, 1928, valued at \$44,094,405.

Outgoing shipments of industrial machinery are given by the Division of Statistics, Department of Commerce, at \$277,754,443 last year, against \$224,804,285 the previous year. In December they were valued at \$21,490,552, compared with \$21,886,828 in November, and with \$19,843,707 in December, 1928.

Power-driven metal-working machinery to the value of \$33,439,278 was exported in 1929, compared with

\$27,421,463 in 1928, while exports in December were valued at \$2,670,402, compared with \$2,902,793 in November, and \$2,582,085 in December, 1928. Exports of other metal-working machinery in 1929 were valued at \$7,364,670, compared with \$6,703,346 in 1928. For December they were valued at \$512,895 in 1929, against \$715,620 in 1928. Exports of metal-working machinery as listed in THE IRON AGE totaled 837 units, valued at \$1,342,625, against 690 units, valued at \$1,424,560, in November.

Exports of all machinery and vehicles in 1929 reached the formidable value of \$1,200,758,879, against \$1,035,544,397 in 1928, the gain being 16 per cent. In December they were valued at \$78,610,475, against \$81,681,361 a year earlier.

Imports of machinery and vehicles in 1929 rose to a value of \$42,202,508, an increase of \$12,452,105, or a little

more than 42 per cent over those of 1928, valued at \$29,750,353. Imports of industrial, office and printing machinery last year were valued at \$24,837,599, against \$18,712,618 in 1928. For December, they were valued at \$1,876,758, against \$1,768,253 in November and \$2,063,000 in December, 1928.

Imports of machinery, as listed in THE IRON AGE table, were valued at \$2,530,065 in December, against \$1,796,844 in November and \$2,478,851 in December, 1928. For the year 1929 they were valued at \$31,854,348, against \$23,157,869 in 1928, the increase being 37.6 per cent.

Agricultural machinery exports made another new record, at \$140,801,000, gaining nearly 30 per cent upon the 1928 total of \$116,524,000, itself the previous record. There has been a steady and rapid gain in this item, from \$29,500,000 in 1922.

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	December		12 Months Ended December	
	1929	1928	1929	1928
Locomotives	\$730	\$11	\$4,767	\$3,181
Other steam engines.....	99	93	781	916
Boilers	211	59	2,086	1,398
Accessories and parts.....	153	42	1,071	632
Automobile engines	178	596	10,216	13,026
Other internal combustion engines	688	665	10,161	8,808
Accessories and parts.....	276	269	4,265	3,501
Electric locomotives	179	292	1,121	1,529
Other electric machinery and apparatus	1,188	916	13,474	8,298
Excavating machinery	672	313	8,221	6,476
Concrete mixers	76	94	1,402	1,106
Road-making machinery	144	212	3,139	2,801
Elevators and elevator machinery	413	436	5,379	4,786
Mining and quarrying machinery	1,140	1,500	17,946	14,059
Oil-well machinery	2,002	1,821	25,004	16,192
Pumps	899	1,007	11,490	8,711
Bending and power presses	260	206	3,330	2,773
Forging machinery	161	83	1,764	955
Machine tools*	2,130	1,315	28,087	15,823
Rolling machines	119	32	1,658	634
Other metal-working machinery and parts	513	716	7,365	6,703
Textile machinery	1,390	1,066	13,657	12,856
Sewing Machines	777	750	10,325	8,605
Shoe machinery	188	122	1,988	1,740
Flour-mill and gristmill machinery	78	95	686	582
Sugar-mill machinery	157	200	4,437	4,692
Paper and pulp mill machinery	183	207	3,917	3,066
Sawmill machinery	78	67	941	920
Other woodworking machinery	298	187	2,522	2,062
Refrigerating and ice-making machinery	782	727	14,079	8,711
Air compressors	463	508	7,590	6,738
Typewriters	1,432	1,867	22,844	21,010
Power laundry machinery	117	140	2,033	1,274
Typesetting machines	450	579	5,770	4,947
Printing presses	416	496	6,472	6,158
Agricultural machinery and implements	12,273	9,426	140,801	116,524
All other machinery and parts	18,271	16,979	211,947	174,091
Total	\$49,584	\$44,094	\$612,736	\$496,284

*Principal details are shown in another table.

Imports of Machinery into the United States

(By Value)

	December		12 Months Ended December	
	1929	1928	1929	1928
Metal - working machine tools..	\$124,915	\$62,182	\$1,459,053	\$568,996
Agricultural machinery and implements	1,229,486	455,977	9,544,509	4,839,018
Electrical machinery and apparatus	118,934	164,769	2,664,169	2,770,303
Other power-generating machinery	24,025	46,071	1,113,261	903,014
Other machinery	812,236	1,438,530	11,921,948	10,648,124
Vehicles, except agricultural	220,469	311,322	5,151,408	3,428,414
Total	\$2,530,065	\$2,478,851	\$31,854,348	\$23,157,869

Exports of Power-Driven Metal-Working Machinery

	December, 1929		November, 1929	
	No.	Value	No.	Value
Engine lathes	79	\$112,975	37	\$66,622
Turret lathes	54	114,108	45	107,572
Other lathes	50	148,092	63	125,783
Vertical boring mills and chucking machines	6	9,182	14	44,517
Thread - cutting and automatic screw machines	197	196,958	85	143,472
Knee and column-type milling machines	51	115,295	67	154,738
Other milling machines	58	151,297	59	193,208
Gear-cutting machines	18	53,388	19	60,526
Vertical drilling machines	24	11,583	18	27,589
Radial drilling machines	21	42,920	24	38,972
Other drilling machines	104	65,832	42	43,214
Planers and shapers	26	50,653	32	74,854
External and cylindrical grinding machines	67	114,891	70	172,507
Internal grinding machines	43	76,332	22	86,522
Metal - working tool-sharpening machines	129	74,069	93	84,464
Total	837	\$1,342,625	690	\$1,424,560

Machinery Markets and News of the Works

Machinery Buyers Delay Action

Prospective Business Slow in Closing, Though Inquiries Are Fairly Numerous

MACHINE tool buyers are slow in taking action on quotations which have been made to them during the past few weeks. A good many inquiries are pending and probably will result in orders eventually, but prospective purchasers are presumably awaiting more definite indications of general business betterment before making commitments.

The Milwaukee railroad is inquiring for about 50 items of shop equipment. Otherwise, railroad business is not an important factor in current business.

Farm implement and machinery manufacturers are among the most active of the metal-working groups in

prospective purchases of tools. A list from the International Harvester Co. is now being quoted on at Chicago, and additional machines will be sought for one of its tractor plants. A farm equipment manufacturer, with plants in Iowa and Indiana, is preparing specifications for a large list of tools.

Considering that January is usually a slow month in machine tool sales, the trade is not concerned over the fact that this month has brought no improvement as compared with December.

The large volume of new quotations is believed to be a forerunner of better sales next month.

New York

NEW YORK, Jan. 28.—Machine tool business in this section is still lacking in a definite trend. With one or two exceptions, dealers and direct sales representatives in New York have had a smaller volume of sales in January than in December. The most promising feature of the situation is that a great many quotations are being made, but prospective buyers are taking more than the usual length of time in deciding upon their purchases. Only a small part of quotations sent out this month resulted in orders, which leaves a considerable amount of pending business.

Bakelite Corporation, 247 Park Avenue, New York, manufacturer of insulating materials, hard rubberized products, etc., is considering early call for bids for initial units of new plant at Bound Brook, N. J., where 150-acre tract recently was acquired, to cost over \$200,000 with equipment. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers.

Westchester Lighting Co., 9 South First Avenue, Mount Vernon, N. Y., an interest of Consolidated Gas Co., 4 Irving Place, New York, will carry out expansion and improvement program to cost over \$3,000,000, including power substations and transmission system.

Anchor Cap & Closure Corporation, 22

Queens Street, Long Island City, N. Y., manufacturer of metal bottle caps, etc., has awarded general contract to Harber Contracting Co., 236 West Twentieth Street, New York, for a six-story addition, to cost more than \$100,000 with equipment.

C. B. Hewitt & Brothers, Inc., 16 Ferry Street, New York, glues, gelatine, etc., has purchased five-story building at 23-25 Greene Street, and will remodel for new storage and distributing plant. Company will remove to new location and concentrate operations there.

Topping Brothers, Inc., 159 Varick Street, New York, manufacturer of marine and other heavy hardware products, has awarded general contract to Industrial Engineering Co., 50 Church Street, for addition to seven-story plant to cost about \$300,000. Russell G. Cory, 30 Church Street, is architect and engineer.

Consolidated Telegraph & Electric Subway Co., 54 Lafayette Street, New York, has leased one-story building to be erected in Bronx for new mechanical shop and truck garage, to cost about \$50,000 with equipment.

Robert Gair Co., 420 Lexington Avenue, New York, manufacturer of corrugated boxes and containers, has plans for a three-story addition to plant at Piermont, N. Y., for storage and distribution to cost about \$100,000 with equipment.

William Higginson, 101 Park Avenue, New York, is architect.

Poloron Electric Mfg. Corporation, 20 Bond Street, New York, has leased for expansion floor in building at 26 Waverly Place.

Murray Klein, 65 Court Street, Brooklyn, architect, has plans for a three-story automobile service, repair and garage building at Jamaica, L. I., to cost over \$200,000 with equipment.

Balloffet Diamond Wire Dies, Inc., 342 Madison Avenue, New York, has leased space in building at 13-15 East Twenty-second Street, for expansion.

Radio Corporation of America, Inc., 233 Broadway, New York, is planning addition to transmitting station at Bound Brook, N. J., with steel towers, power station facilities, etc., to cost more than \$600,000 with equipment.

Curtiss Airport Corporation, 27 West Fifty-seventh Street, New York, is having plans drawn for terminal, operating and repair building on Sunrise Highway, Valley Stream, N. Y., to cost over \$100,000 with equipment. Kenneth Franzheim, 345 Madison Avenue, is architect; Stone & Webster Engineering Corporation, 120 Broadway, is supervising architect and engineer.

J. Strum & Co., 65 Commercial Street, Newark, manufacturers of commercial automobile bodies, wagons, etc., have filed plans for extensions and improvements in recently acquired plant at 225 Wilson Avenue, and will soon occupy for increased capacity. R. C. Klemm, 94 Broad Street, is architect.

Western Electric Co., 195 Broadway, New York, has asked bids on general contract for an eight-story and basement addition to plant at Kearny, N. J., to cost over \$350,000 with equipment.

Driver-Harris Co., Middlesex Street, Harrison, N. J., manufacturer of wire products, is considering plans for a one-story power house for general factory service, to cost more than \$70,000 with equipment. J. A. Finegan, 776 Broad Street, Newark, is architect and engineer.

Richardson Co., Codwise Avenue, New Brunswick, N. J., manufacturer of battery boxes and containers, which recently removed its plant from Cleveland, has awarded a contract to Blaw-Knox Co., 342 Madison Avenue, for one-story addition.

Board of Education, City Hall, Newark, has authorized installation of manual training department in school to be erected on Ivy Street, for which plans have been filed, to cost over \$500,000. Guilbert & Betelle, 24 Bradford Place, are architects.

Sinclair Refining Co., 45 Nassau Street, New York, is contemplating an oil storage and distributing plant near Linden, N. J., to cost more than \$160,000 with equipment. Engineering department of company is in charge.

Public Service Corporation, Public Service Terminal, Newark, has arranged for sale of bonds totaling \$20,000,000, part

of fund to be used for plant and transmission expansion and improvements.

Royal Engineering Co., Inc., has leased building at 463-465 Chancellor Avenue, Irvington, N. J., for manufacture of special machinery, automotive equipment, tools and dies.

Philadelphia

P HILADELPHIA, Jan. 27.—City Council, Philadelphia, is completing plans for purchase of Hog Island tract from United States Shipping Board at offered price of \$3,000,000. Site totals 900 acres and will be used as airport, rail and marine terminal, to include construction of hangars, repair shops, oil storage and other mechanical units, with warehouses equipped with elevating, conveying and other mechanical-handling machinery. More than \$4,000,000 will be expended.

Rainbow Light, Inc., 21-43 Forty-fourth Road, Long Island City, N. Y., manufacturer of continuous tube lighting equipment, has leased part of building at 1825-29 North Twentieth Street, Philadelphia, for a new branch assembling plant.

Officials of Clarke Can Co., Twelfth and Fitzwater Streets, Philadelphia, manufacturer of tin cans and containers, are organizing Clarke Can Co., Inc., to take over and expand present plant and business.

Barrett Co., Thirty-sixth Street and Grays Ferry Avenue, Philadelphia, manufacturer of roofing products, etc., is considering immediate rebuilding of part of plant recently destroyed by fire, with loss over \$400,000 including equipment.

West Philadelphia Buick Co., 1425-29 Chestnut Street, Philadelphia, local representative for Buick automobile, has leased three-story building at 304 North Broad Street, totaling 20,000 sq. ft. floor space, for new service, repair and sales building.

United States Pipe & Foundry Co., East Burlington, N. J., has awarded general contract to J. S. Rogers Co., Drexel Building, Philadelphia, for three-story addition, 30 x 60 ft., for general operating service. Ballinger Co., Twelfth and Chestnut Streets, Philadelphia, is architect and engineer.

Shell Eastern Petroleum Products Co., 112 East Forty-second Street, New York, has plans for new oil storage and distributing plant at Trenton, N. J., to cost about \$80,000 with equipment.

Chester Water Service Co., Fifth and Welsh Streets, Chester, Pa., has awarded general contract to Public Works Engineering Corporation, 40 Exchange Place, New York, for two-story equipment, service and repair building, to cost about \$45,000.

State Board of Education, State Office Building, Trenton, N. J., will soon take bids for a power plant for school service, to cost \$100,000 with equipment. Guilbert & Betelle, 24 Brandywine Place, Newark, N. J., are architects.

In connection with new Cumberland Valley Institution for Mental Defectives, near White Hill, Pa., to be carried out by State Department of Property and Supplies; Harrisburg, Pa., a group of mechanical and industrial shops, totaling 161,000 sq. ft., will be built. W. H. Lee, Schaff Building, Philadelphia, is architect.

School District of Phoenixville, Pa., is considering installation of manual training equipment in two-story junior high school to cost about \$400,000, for which it is expected to ask bids on general

The Crane Market

A GOOD volume of inquiry for overhead cranes has accumulated, but buyers continue to delay in making awards. Most builders, however, are fairly well engaged and not in need of immediate business. In the New York district, Lockwood Greene, Engineers, Inc., is about to close on a 5-ton, 22-ft. 8-in. span, 3-motor crane for Allentown, Pa. The New York Power & Light Co., Albany, N. Y., recently awarded two 150-ton, 5-motor, power station cranes to the Whiting Corporation. New inquiry for locomotive cranes is rather limited, and but little business has been placed. The Boston & Albany Railroad has awarded a 25-ton locomotive crane with pile-driver attachment to an unnamed builder.

contract in February. Ritter & Shay, Fifteenth and Chestnut Streets, Philadelphia, are architects.

Nicetown Mfg. Co., 4250 Wissahickon Avenue, Philadelphia, has been incorporated to take over operations of Philadelphia Lawn Mower Co., Inc., Davis Brothers, Inc., and Paul & Beekman Mfg. Co., all of Philadelphia, which for some time have had interlocking interests. All manufacturing will be done at 4250 Wissahickon Avenue by Nicetown Mfg. Co. and companies taken over will function as sales agencies. Officers of Nicetown Mfg. Co. are: Edward L. Davis, president; H. M. Hessenbruch, vice-president in charge of operations; W. A. B. Paul, vice-president in charge of sales; S. H. Paul, vice-president in charge of engineering; W. B. Whitney, secretary and treasurer.

New England

BOSTON, Jan. 27.—Current sales continue light and involve inexpensive tools. New inquiries, as well as those pending, give little promise of closing within the next month. The largest used tool reported sold the past week was a Thompson grinder to an Everett plant. A Worcester machine tool builder is receiving considerable new business, but the industry as a whole is rapidly catching up with orders and delivery dates are growing nearer.

North Attleboro Foundry Co., North Attleboro, Mass., has plans for a gray iron foundry to replace one recently destroyed by fire.

United Illuminating Co., New Haven, Conn., will soon take bids on a power station addition at Bridgeport. A 12,500-kw. turbine unit is required.

Eastern Mfg. Co., Providence, has plans for a one-story and basement plant, 78 x 173 ft. Mechanical and electric equipment will be bought.

Danbury-Bethel Gas & Electric Light Co., Danbury, Conn., has plans for a coke screening plant, to replace one recently destroyed by fire.

Bath Iron Works Corporation, Bath, Me., reorganized about two years ago, since then has launched nine boats and has sufficient business on its books to maintain operations on its current schedule for many months. Company employs about 800 mechanics.

Foxboro Co., Neponset Avenue, Foxboro, Mass., manufacturer of steam flow

meters and other precision measuring instruments, is considering a two-story and basement addition, including improvements in present factory, to cost about \$50,000.

Gulf Refining Co., 21 State Street, New York, has plans for an oil storage and distributing plant at Norwalk, Conn., including main one-story unit, 60 x 120 ft., and garage and service building, 60 x 90 ft., to cost over \$75,000 with tanks and equipment.

New England Power Association, Worcester, Mass., has arranged for bond issue of \$25,000,000, part of proceeds to be used for expansion and improvements, including completion of hydroelectric power project now under way near St. Johnsbury, Vt., with steel tower transmission line to Lowell, Mass., and vicinity.

James Hunter Machine Co., North Adams, Mass., manufacturer of textile machinery and parts, has work under way on a one-story addition, to cost more than \$35,000 with machinery.

General Electric Co., Boston Avenue, Bridgeport, Conn., has awarded general contract to Pardy Construction Co., 1481 Seaview Avenue, Bridgeport, for four-story addition to local plant, 80 x 200 ft., for production of wires and cables, to cost over \$175,000 with equipment.

Greenfield Electric Light & Power Co., Greenfield, Mass., has applied for permission to issue stock to total \$500,000, part of proceeds to be used for extensions and improvements.

Manchester Construction Co., 875 Main Street, Manchester, Conn., is remodeling and extending a former storage building to manufacture special automobile and truck bodies, including heavy forge and blacksmithing. An addition, 30 x 40 ft., will be provided.

United Shoe Machinery Corporation has removed its general offices to 140 Federal Street, Boston.

South Atlantic

BALTIMORE, Jan. 27.—In connection with an expansion and improvement program to cost \$100,000,000, Chesapeake & Ohio Railroad Co., Richmond, Va., is planning new coal pier at Newport News, Va., including mechanical-handling equipment, cranes, etc., entire project to cost \$1,500,000. A similar pier for merchandise service will be built at Hampton Roads, Va., with mechanical-handling equipment, etc., to cost a like sum. A new freight house will be constructed at Cincinnati to cost \$750,000 with equipment, and new freight terminal at Columbus, Ohio, to cost about a like amount. Program will include extensions and betterments in car and locomotive shops. Company has awarded a general contract to Esker W. Waugh, Huntington, W. Va., for new engine house with shop facilities at Peach Creek, W. Va., to cost over \$100,000 with equipment. C. W. Johns, Richmond, is chief engineer.

Eastern Rolling Mill Co., Sewer Road, Baltimore, is carrying out expansion to provide for greater diversity in output, heretofore limited largely to steel sheets and other material for automobile service. In future, plant will be given over to production of sheet steel for furniture, refrigerator and office fixtures. Entire program will cost close to \$350,000 including equipment, and is scheduled for completion in March.

South Carolina Power Co., Charleston, S. C., is arranging for expansion and betterments to cost \$2,500,000, including

power plants, substations and transmission lines. Plans have been approved for new steam-operated electric power plant at McClellanville, S. C., to cost over \$100,000 with lines.

Graybar Electric Co., 420 Lexington Avenue, New York, electrical supplies and equipment, is arranging for new factory branch and distributing plant at Durham, N. C., and plans to begin operation at that place in March.

R. W. Norris & Sons, 342 North Gay Street, Baltimore, automobile equipment and supplies, will take bids at once on general contract for one-story machine and repair shop, to cost \$50,000 with equipment. Owens & Sisco, Continental Building, are architects.

Southern Cotton Oil Co., Charlotte, N. C., plans rebuilding of portion of local mill destroyed by fire Jan. 21.

Union Storage & Warehouse Co., Charlotte, N. C., is planning addition to cold storage and refrigerating plant, to cost about \$400,000 with equipment.

Kent-Coffey Mfg. Co., Lenoir, N. C., manufacturer of furniture, is arranging for extensions and improvements, including four-story addition and another multi-story unit for machine division, to cost more than \$70,000 with equipment.

Pittsburgh

PITTSBURGH, Jan. 27.—Machinery business in this district improved slightly last week, at least from the standpoint of new inquiry. Orders again were rather light and the aggregate business in January will fall considerably below expectations. Buyers of machine tools are still slow in placing orders, although a number of jobs are being held up on account of the delay in making appropriations, rather than by business uncertainty. Judging by the number of tools under inquiry, most dealers expect February to be a good month.

Large industrial lists are still rather scarce, although a number of companies are negotiating quietly for lists of a half dozen or more tools. The railroads continue the most disappointing factor in the market although it is reported that the Pennsylvania will come out for large requirements within the next 60 days.

Dravo Contracting Co., Neville Island, Pittsburgh, operating a boat and steel barge manufacturing plant, with repair division, is planning for expansion and improvements, including marine railways, shipyard facilities, shops, etc., to cost over \$125,000. Work is scheduled for completion early in spring.

Vulcan Defining Co., Neville Island, Pittsburgh, has awarded general contract to Austin Co., for one-story addition to local Republic plant, 100 x 400 ft., to cost about \$225,000 with equipment.

Texas Corporation, 17 Battery Place, New York, is planning oil storage and distributing plant at East Clarksburg, W. Va., to cost over \$75,000 with steel tanks and equipment.

Clayco Co., Diamond, W. Va., a subsidiary of Carbide & Carbon Chemical Corporation, Charleston, W. Va., has awarded general contract to H. K. Ferguson Co., Cleveland, for one-story addition for manufacture of by-products from oil and gasoline, to cost over \$80,000 with equipment.

J. B. McIntire, 513 McNair Avenue, Wilkinsburg, Pa., and associates have organized Rolmill Appliance Co., with

capital of \$25,000, and plans operation of works at Apollo, Pa., for manufacture of heavy mill equipment and parts. Kenneth R. Cunningham, 6500 Bartlett Street, Pittsburgh, is interested in new organization.

Municipal Electric Department, 228 Sixth Street, Ellwood City, Pa., is planning extensions and improvements in municipal electric light and power plant, including installation of equipment. L. Monroe, Borough Building, is engineer.

Board of Education, Beaver Falls, Pa., is considering installation of manual training equipment in new two-story high school to cost about \$230,000, for which bids have been asked on general contract. Carlisle & Sharrer, Martin Building, Pittsburgh, are architects.

Emmerson - Brantingham Corporation, Batavia, Ill., is planning changes and improvements to double production of commercial bodies.

Foote Brothers Gear & Machine Co., Chicago, has begun work on a \$200,000 order for Illinois Waterways Commission. Company has delivered \$50,000 worth of equipment, including gears and lock operating machinery, for use in construction work between Lockport and Utica, Ill.

Crane Co., 836 South Michigan Avenue, Chicago, has awarded general contract to Nolan Burk Co., 111 West Washington Street, for one-story addition to plant at Forty-first Street and Kedzie Avenue, 40 x 160 ft., to cost about \$45,000 with equipment. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, are architects.

Electric Coal Mining Machinery Co., 309 St. John Court, Chicago, will take bids early in February for two-story addition to plant at Danville, Ill., to cost over \$65,000 with equipment. Lewis & Daugherty, Adams Building, Danville, are architects.

Woodward Governor Co., Mill Street, Rockford, Ill., manufacturer of engine governors, etc., has plans for a two-story addition, 70 x 160 ft., to cost over \$50,000 with equipment. Frank A. Carpenter, Brown Building, is architect.

Commonwealth Edison Co., 72 West Adams Street, Chicago, has plans for three-story power substation to cost about \$400,000 with equipment. Holabird & Root, 333 North Michigan Avenue, are architects.

Chicago, Burlington & Quincy Railroad Co., 547 West Jackson Boulevard, Chicago, is considering engine house with shop facilities at Creston, Iowa, to cost more than \$50,000 with equipment.

Julius Andrae & Sons, Inc., Waterloo, Iowa, electric equipment and supplies, has work under way on a one-story storage and distributing plant, 90 x 135 ft., for which general contract recently was let to John G. Miller & Sons Construction Co., Caward Building, to cost about \$40,000 with equipment.

Triplex Tool Co., 228 North La Salle Street, Chicago, is considering a new one-story plant, to cost over \$30,000 with equipment.

Canadian-American Air Lines, Inc., 106 South Fourth Street, Minneapolis, Minn., is planning construction of an airport on West Mississippi River Road, about two miles from city limits, comprising 12 hangars, repair and reconditioning shops, oil storage and other units, to cost about \$200,000 with equipment. Norman G. Warsinske is vice-president and general manager.

Des Moines Steel Co., 421 Southwest Fourth Street, Des Moines, Iowa, has plans for a one-story addition, 50 x 120 ft., to cost about \$30,000 with equipment.

Buffalo

BUFFALO, Jan. 27.—Frontier Bronze Corporation, 818 Elmwood Avenue, Buffalo, is considering one-story addition, to cost more than \$40,000 with equipment. J. M. Brown is head.

Hydrovator Co., Buffalo, recently organized to manufacture garage equipment, has leased two-story building at 326 Ellicott Street for establishment of plant.

National Lime, Cement & By-Products Corporation, Stock Exchange Building,

Buffalo, is arranging for sale of a preferred stock issue to total \$250,000, proceeds to be used for construction of new hydrate lime plant near Tuscaloosa, Ala. By-products plant will be installed and operated at same location. Soule & Zepp, Inc., 507 North Charles Street, Baltimore, is consulting engineer. Schuyler L. Hoff is secretary.

Crown Zellerbach Corporation, San Francisco, is arranging for early operations at former mill of West End Paper Co., Carthage, N. Y., and will provide equipment for an initial output of about 9000 tons of tissue papers a year. Plant will be affiliated with National Paper Products Co., another subsidiary of Crown Zellerbach Corporation, with plant at Carthage.

Power Control Corporation, Syracuse, N. Y., recently formed by Edward T. Moore, 119 Dorset Street, and associates, with capital of 4000 shares of stock, no par value, plans early operation of local plant to manufacture power equipment. Floyd R. Gilfoil, 702 Seeley Road, is also interested in new organization.

Visco Meter Corporation, 315 Grote Street, Buffalo, has plans for new one-story plant for manufacture of precision equipment and parts, to cost about \$35,000 with equipment. G. Morton Wolfe, 1377 Main Street, is architect.

Conomatic Corporation, Buffalo, manufacturer of automatic amusement devices and equipment, with headquarters at Toronto, Ont., has leased space in Gutman Building, South Division and Elm Streets, Buffalo, and will establish branch plant for American distribution.

Board of Education, Hornell, N. Y., is considering installation of manual training equipment in three-story high school addition, to cost about \$200,000. Haskell & Considine, Hulett Building, Elmira, N. Y., are architects.

Milwaukee

MILWAUKEE, Jan. 27.—While machine tool orders this month show no large increase over those in December, there is a considerable volume of pending business and new inquiries from diversified industries. Local business is delayed principally on account of retarded factory expansion, adverse weather and slowness in making up budgets. Some metal-working plants are increasing production, particularly those in the agricultural implement and power machinery fields.

Pioneer Foundry Co., Waukesha, Wis., is selecting a site for a new plant following sale of present buildings to be vacated March 1. Arthur C. Nickel, Jr., is manager of foundry.

Western Printing & Lithographing Co., Racine, Wis., has awarded general contract to Austin Co. for an addition to cost \$100,000.

J. T. Hurd, city engineer, La Crosse, Wis., will close bids, Feb. 12 for furnishing and installing one 1400-gal. vertical pump, 40 hp. slipring motor with motor control, primer, check valve and two-way ell.

Lakeside Malleable Castings Co., Twenty-third and Clark Streets, Racine, Wis., has increased its capital stock from \$100,000 to \$200,000 to provide for a building program and additional working capital following acquisition of business of Wisconsin Malleable Iron Co., whose Mil-

waukee plant was destroyed by fire four months ago. Additions to pattern plant and offices have been completed.

Magnetic Mfg. Co., Milwaukee, manufacturer of magnetic separators and other magnetic equipment, is building a research laboratory for working out special problems. Equipment will be installed for magnetically testing minerals, metals, ores and other materials.

St. Louis

ST. LOUIS, Jan. 27.—Red Wing Commercial Aircraft Co., Rosecrans Field, St. Joseph, Mo., has plans for one-story plant for parts production and assembling, to cost about \$65,000 with equipment.

Missouri Power & Light Co., Kansas City, Mo., is planning one-story electric-operated pumping plant at Jefferson City, Mo., to cost about \$70,000 with equipment. N. R. Beagle is district manager at Jefferson City.

Arkansas Power & Light Co., Pine Bluff, Ark., has plans for a one-story ice-manufacturing plant at Forrest City, Ark., to cost about \$55,000 with equipment.

Ryan Aircraft Corporation, Lambert-St. Louis Flying Field, St. Louis, has plans for one-story addition, 64 x 90 ft., to cost about \$30,000 with equipment. Company is subsidiary of Aircraft Development Corporation, Detroit. McDonald & Condé, 4485 Olive Street, St. Louis, are architects.

Board of Education, Topeka, Kan., plans installation of manual training equipment in new three-story and basement senior high school to cost over \$1,000,000, for which bids are being asked on general contract. Thomas W. Williamson & Co., Farmers' National Bank Building, are architects.

Missouri Hydro-Electric Power Co., R. A. Long Building, Kansas City, Mo., has begun work on hydroelectric power project and has awarded general contract to W. E. Callahan Construction Co., Arcade Building, St. Louis, for power dam. Entire development will cost over \$4,000,000. Ralph W. Street, vice-president, is in charge.

Mid-Continent Oil Co., Cosden Building, Tulsa, Okla., is planning new storage and distributing plant at Muskogee, Okla., to cost more than \$65,000 with equipment. Charles M. Murrie, address noted, is superintendent of construction.

City Council, Campbell, Mo., has plans for extensions and improvements in municipal electric light and power plant, to cost about \$70,000 with equipment. Russell & Axon, 6200 Easton Avenue, St. Louis, are engineers.

Indian Territory Illuminating Oil Co., Bartlesville, Okla., is considering new gasoline producing plant near Oklahoma City, Okla., to cost over \$70,000 with equipment.

Coblenz Planing Mill & Body Works, Inc., Hastings, Neb., manufacturer of automobile bodies, etc., has filed plans for one-story addition, 40 x 125 ft., to cost about \$30,000 with equipment. C. E. Coblenz is head.

Board of Education, Sidney, Neb., is considering installation of manual training equipment in new two-story high school to cost about \$220,000, for which plans will be drawn by Meginnis & Schaumberg, Federal Trust Building, Lincoln, Neb., architects.

Cincinnati

CINCINNATI, Jan. 27.—Although the machine tool market is quiet, brisk inquiry for one or two machines at a time continues. Plants are operating at capacity and indications are that this rate will be maintained through this quarter and perhaps into the second, even if only a little more business is booked. Unfilled orders are still fairly large. Buyers, while not reluctant to inquire freely, seem cautious in closing orders.

Cincinnati Street Railway Co., Dixie Terminal Building, Cincinnati, is considering new car barns with shop facilities, to cost \$125,000 with equipment. Walter A. Draper is president.

General Kontroler Co., 200 East First Street, Dayton, Ohio, manufacturer of electric control systems and equipment, has plans for one-story addition, 60 x 150 ft., to cost about \$60,000 with equipment.

Manchester Lime Co., Manchester, Tenn., is considering one-story addition to cost about \$45,000, for storage and distribution with elevating, conveying and other mechanical-handling equipment.

Hill Auto Body Metal Works, 818-22 Reedy Avenue, Cincinnati, is considering one-story addition for production of aircraft accessories and equipment, a new branch of output, to cost about \$70,000 with machinery.

Brownell Co., North Findlay Street, Dayton, Ohio, manufacturer of boilers, tanks, underfeed stokers, etc., has taken bids for a two-story addition, 35 x 105 ft., to cost about \$100,000 with equipment. Geyer & Neuffer, Ludlow Arcade, are architects.

Mary Helen Coal Corporation, Coalgood, Ky., is arranging to rebuild tipple recently destroyed by fire, to cost about \$40,000 with equipment.

Tennessee Cereal Co., Nashville, Tenn., has begun erection of a new four-story mill, to cost over \$85,000 with equipment. Conveying and other mechanical-handling equipment will be installed.

Cleveland

CLEVELAND, Jan. 27.—Machine tool business picked up somewhat the past week. Local dealers and manufacturers took quite a few scattering orders, none of which was for more than two machines. Much of the business had been pending since December and the orders were for machines actually needed for present operations. There is still a disposition among buyers to defer purchases of machinery that they can get along without for the present. The automotive industry, including parts makers, which usually supplies the greater part of the machinery orders in this territory is still staying out of the market. Some activity has developed in wood-working machinery.

Tyson Roller Bearing Co., Ohio Merchants' Trust Building, Massillon, Ohio, recently organized by C. E. Stuart, formerly president of Central Alloy Steel Corporation, Massillon, and associates, has purchased property at Columbia Heights for early erection of new plant to cost about \$85,000 with equipment. Frank Tyson, Canton, Ohio, will be an official of new company, of which Mr. Stuart will be president.

North American Edison Co., Cleveland,

operating Cleveland Electric Illuminating Co., Illuminating Building, and other utilities, is disposing of a bond issue of \$25,000,000, part of proceeds to be used for extensions and improvements.

Board of Education, Washington Township, Point Place, Ohio, is considering installation of manual training equipment in new high school, to cost \$225,000, for which plans will be prepared by Stephlet & Stephlet, Security Bank Building, Toledo, Ohio, architects.

Chandler Products Corporation, Terminal Tower Cleveland, manufacturer of automobile equipment and parts, has awarded general contract to Sam W. Emerson Co., 1836 Euclid Avenue, for one-story plant, 90 x 190 ft., to cost about \$130,000 with machinery.

Shell Petroleum Corporation, Shell Building, St. Louis, has begun construction of new oil storage and distributing plant at Toledo, Ohio, to cost \$425,000 including equipment.

B. F. Goodrich Co., Akron, Ohio, manufacturer of automobile tires, mechanical rubber goods, etc., has purchased Miller Rubber Co., manufacturer of automobile tires, with local mill, and will operate as a subsidiary. In connection with expansion program, purchasing company is considering erection of new mill near Atlanta, Ga., where 25-acre tract recently was acquired, to cost more than \$4,000,000 with machinery.

Detroit

DETROIT, Jan. 27.—Homer Furnace Co., 290 South Clay Street, Coldwater, has plans for a one-story addition, to cost about \$70,000 with equipment. B. Hillborg, 130 North Hudson Street, is engineer.

Detroit Steel Products Co., 2250 East Grand Boulevard, Detroit, has completed an addition, totaling about 125,000 sq. ft., and will use exclusively for production of automobile chassis springs. New unit represents an investment of over \$200,000.

Humphries Tractor Co., 209 West Fifth Street, Royal Oak, is planning construction of first unit of new plant, one story, 60 x 200 ft., to cost about \$60,000 with equipment.

Copper Range Mining Co., Freda, near Calumet, is planning extensions and improvements in local milling plant, with installation of additional equipment, to cost about \$80,000.

Kawneer Co., 642 Beaubien Avenue, Detroit, manufacturer of metal store fronts, is expanding production and diversifying its line, to include a division for manufacture of hollow steel struts for airplanes.

Department of Parks and Boulevards, 735 Randolph Street, Detroit, has plans for two-story equipment, service and repair building at River Rouge Park, to cost over \$125,000 with machinery.

Bohn Aluminum & Brass Corporation, 2512 East Grand Boulevard, Detroit, has plans for one-story addition, to cost over \$70,000 with equipment. Christian W. Brandt, 2111 Woodward Avenue, is architect and engineer.

Consolidated Paper Co., Monroe, is considering rebuilding part of storage and distributing plant destroyed by fire Jan. 16.

Sparta Foundry Co., Sparta, has plans for a one-story addition for manufacture of piston rings, to cover over \$50,000 with

equipment. It is proposed to increase capacity to 300,000 piston rings a day.

Stewart-Brown Steel Corporation, Detroit, recently incorporated by P. B. Stewart and G. D. Brown, is operating sheet and strip steel warehouse at 8651 Epworth Boulevard.

Howell Electric Motors Co., Howell, Mich., has purchased Jeannin Electric Co., Toledo, Ohio, manufacturer of single-phase and direct-current motors ranging from 1/30 hp. to 10 hp. Equipment and business of Jeannin company will be moved to Howell plant gradually and Jeannin motors will be added to line now being produced by Howell Electric Motors Co. Purchase was made for cash and without change in corporate structure of Howell company.

Dr. W. O. Hotchkiss, president, Michigan College of Mining and Technology, Houghton, Mich., will take bids until Feb. 5 on four-story engineering building, 65 x 160 ft., with three-story wing, 48 x 110 ft., to cost about \$300,000. Derrick Hubert, Menominee, Mich., is architect.

Indiana

INDIANAPOLIS, Jan. 27.—Bendix Brake Corporation, Bendix Drive, South Bend, manufacturer of automobile and aircraft equipment, has awarded general contract to H. G. Christman & Co., 306 South Notre Dame Avenue, for one-story foundry, 175 x 200 ft., to cost about \$75,000 with equipment.

Lee Body & Trailer Co., Plymouth, is considering one-story addition, to cost about \$45,000 with equipment.

Municipal Electric Light and Power Works, Fort Wayne, is considering expansion and improvements in power plant and lines, to cost about \$300,000 with equipment.

Terre Haute Paper Co., Prairieton Avenue, Terre Haute, is contemplating addition to plant to cost more than \$45,000 with equipment.

O. P. Link Handle Co., Salem, is planning early erection of one-story plant, 150 x 350 ft., to replace works recently destroyed by fire, to cost more than \$80,000 with equipment. Norman Link is general manager.

Capehart Automatic Phonograph Co., East Pontiac Street, Fort Wayne, has awarded general contract to Rump-Lintz Co., Medical Arts Building, for one-story addition, 160 x 160 ft., to cost over \$75,000 with equipment. Charles R. Weatherhogg, 250 West Wayne Street, is architect.

Vincennes Packing Corporation, 1325 McDowell Street, Vincennes, has awarded a general contract to John A. Keller & Son, 818 DuBois Street, for a two-story addition, 110 x 150 ft., to cost \$65,000 with cannery machinery, conveying equipment, etc. John B. Bayard, 231 Main Street, is architect.

Hurwicz Iron Co., 631 East Monroe Street, South Bend, has awarded general contract to Rochester Bridge Co., Rochester, for one-story storage and distributing plant, 50 x 140 ft., to cost about \$25,000 with equipment.

St. Louis branch of Ames Shovel & Tool Co. has been moved to plant at Anderson, Ind., where operations will be centered hereafter. Branch units at Beaver Falls, Pa., and Elwood, Ind., were moved to Anderson about a year ago and two new buildings erected.

Combustioner, Inc., manufacturer of automatic stokers, will move from Cicero, Ill., to Goshen, Ind., where it expects to begin operations in April in former plant of Engman Range Co.

Gulf States

BIRMINGHAM, Jan. 27.—Adair Machine Works, Inc., 2412 Railroad Avenue, Houston, Tex., is planning enlargements for manufacture of oil-well tools for drilling and other field service, to cost about \$25,000 with equipment.

Dixie Gas & Fuel Co., Marshall, Tex., is planning for expansion and improvements in this district, including pipe line construction and other work, to cost \$100,000.

Kimball Milling Co., Fort Worth, Tex., has filed plans for addition to grain elevator, to cost \$300,000 with elevating and conveying equipment, screening apparatus, etc. General contract has been let to Jones-Hettelsater Construction Co., Kansas City, Mo. Kay Kimball is president.

Central Power & Light Co., Frost National Bank Building, San Antonio, Tex., has plans for ice-manufacturing plant at Raymondville, Tex., to cost about \$60,000 with machinery. John M. Marriott is company architect.

Board of Directors, Dallas Vocational School, C. A. Jay, president, is arranging to begin construction in March on new trade and vocational school on 20-acre tract in Richmond Hill district, entire project to cost over \$250,000 with equipment. It is expected to ask bids next month.

Lone Star Gas Co., Galveston, Tex., plans booster station for natural gas lines at Brad, Palo Pinto County, to cost about \$100,000 with air compressors and other equipment.

Crane Co., 836 South Michigan Avenue, Chicago, has plans for one-story factory branch and distributing plant at Jackson, Miss., to cost about \$40,000 with equipment. N. W. Overstreet, Mississippi Fire Insurance Building, Jackson, is architect.

Mississippi Power Co., Gulfport, Miss., plans extensions and improvements in local steam-operated electric power plant, including installation of an exciter and other equipment.

Acme Products Co., De Quincy, La., a subsidiary of Gilligan-Chipley Co., Whitney Annex, New Orleans, is considering extensions and betterments in turpentine products plant, with equipment to double present capacity, to cost over \$500,000.

International Harvester Co., 606 South Michigan Avenue, Chicago, will soon take bids on general contract for one and two-story factory branch and distributing plant at Sweetwater, Tex., 100 x 600 ft., part to be used for assembling, to cost about \$115,000 with equipment.

City Council, Shreveport, La., is planning installation of pumping plant for municipal waterworks, near Cross Lake, to cost over \$150,000 with machinery. J. N. Chester Engineers, Inc., Clark Building, Pittsburgh, is engineer.

Houston Stamp & Stencil Co., 815 Fanin Street, Houston, Tex., has begun construction of one-story plant, to cost about \$40,000 with equipment.

Columbus Iron Works Co., Columbus, Ga., manufacturer of circulating type gas heaters, desires catalogs and prices on radiants for use in gas heaters.

Canada

TORONTO, Jan. 27.—Machine tool manufacturers and dealers are receiving larger orders and a number of lists are out which will considerably augment sales for the coming month or six weeks. Railroad shops are taking more tools, and the automotive industry is more active.

Beauharnois Power Corporation, Montreal, is purchasing a large amount of machinery and general equipment for its construction program. During past week company awarded three additional contracts involving an expenditure of about \$200,000.

Crane, Ltd., 1170 Beaver Hall Hill, Montreal, is contemplating erection of a plant at St. John's, Que., to cost \$1,000,000.

A number of contracts have been awarded for rebuilding foundry at Sandwich, Ont., for Sandwich Foundry, Ltd., whose plant was recently destroyed by fire. Some equipment is yet to be purchased.

Western Canada

According to W. E. Armstrong, Winnipeg, Man., Western manager of Canada Gypsum & Alabastine Co., plans are under way for erection of works at East Calgary, Alta., on which initial expenditure will be about \$150,000. Other units will be built later.

Canadian Industries, Ltd., Paris Building, Winnipeg, will start work in spring on erection of an explosives plant at East Selkirk, Man., to cost \$1,000,000.

Pacific Coast

SAN FRANCISCO, Jan. 23.—General Electric Co., Schenectady, N. Y., is planning expansion at plant at Oakland, Cal., including new buildings and equipment, to cost over \$500,000.

Bucklein Engineering & Supply Co., 336 South San Pedro Street, Los Angeles, Cal., has plans for a one and two-story factory, 75 x 80 ft., to cost about \$25,000 with equipment.

Southern California Edison Co., Los Angeles, is arranging for expansion and improvements to cost \$23,600,000. About \$2,000,000 of fund will be used for completion of addition to steam-operated electric generating plant at Long Beach, Cal., now under way.

Liquid Carbonic Co., 3100 South Kedzie Street, Chicago, manufacturer of bottling machinery and other equipment for carbonated beverages, has awarded general contract to Austin Co. of California, Inc., Los Angeles, for new plant on 2½-acre tract near Los Angeles, to cost about \$100,000 with equipment.

Compton Union High School District, Compton, Cal., has plans for a new high school, to include a one-story vocational shop, to cost \$100,000. Frank M. Goodwin, Stockwell Building, Compton, is architect.

Pacific Power & Light Co., Portland, is considering new power plant at Bend, Ore., to cost about \$235,000 with equipment, including about \$100,000 for transmission lines. W. A. Lackaff, Bend, is manager of Central Oregon District.

A steam power plant will be constructed by Van de Kamp's Holland Dutch Bakers, San Fernando Building, Los Angeles, in connection with a four-story plant at Hollywood, to include ovens, conveying machinery and other mechanical equipment. Entire project will cost \$500,000. McCormick Co., 41

Park Row, New York, is architect and engineer.

San Joaquin Light & Power Corporation, Fresno, Cal., has plans for a steam-operated electric generating plant in Kettleman Hills oilfields, near Fresno, to cost about \$3,000,000 with transmission lines. Station will operate with natural gas as fuel. Company also plans hydroelectric generating plant at Merced Falls, Cal., to cost over \$250,000 with transmission system. A. Emory Wishon is vice-president and general manager.

American Creamery Co., 1433 Cypress Avenue, Oakland, Cal., will convert its present plant into a machine shop following erection of new two-story milk products plant, 170 x 180 ft., to cost about \$200,000 with machinery. Engineering department of company is in charge.

Axelson Machine Co., Los Angeles, maker of oil field equipment, has changed its name to Axelson Mfg. Co., Ltd. Expansion program, started last year and involving expenditure of \$300,000, will be continued.

W. S. Morse, Detroit, and W. S. Grau, Los Angeles, have formed Morse-Grau Tool & Mfg. Co., 1520 East Slauson Avenue, Los Angeles. New company will specialize in design and manufacture of special tools and in commercial heat treating.

Foreign

PLANS are under way by Lautaro Nitrate Co., Ltd., operated by Anglo-Chilean Consolidated Nitrate Corporation, 120 Broadway, New York, for new nitrate plant at properties in Chile, to cost more than \$3,500,000 with machinery. New plant will operate under Guggenheim process and is scheduled for service in 1932. Company now has group of 26 plants in Chile, equipped to operate under another process, and it is understood that extensions and improvements will be made at several of these units.

Union Co., Drammen, Norway, will carry out an expansion program at local newsprint mill, including installation of new paper-making machine with complete auxiliary equipment, including pulp machinery. Paper-making machine will be furnished by Pusey & Jones Corporation, Wilmington, Del. Work is scheduled for completion in June and will cost over \$300,000.

Ford Motor Co., Detroit, has secured property at Cologne, Germany, for new plant for parts production and assembling, to cost \$1,000,000 with machinery. Edmund Koerner, Essen, Germany, architect, will prepare plans.

Hammarsforsens Power Co., Stockholm, Sweden, operated by Kreuger & Toll Co., Stockholm, is planning construction of steel tower transmission line to connect hydroelectric generating plants with paper mill properties of parent company. Line will be about 185 miles long, and will cost more than \$1,500,000 with switching stations and other power facilities. Following completion, Kreuger & Toll Co. plans expansion in several paper mill and pulp properties.

Gelsenkirchen Bergwerk A-G., Frankfurt, Germany, operating iron and steel and coal properties in Ruhr district, is planning expansion, including new by-products plant for production of nitrogen fertilizer, primary output to be synthetic ammonia, etc. Plant will have capacity of about 30,000 tons per annum, and will cost over \$400,000 with machinery.

New Trade Publications

Chain and Hoist Equipment.—David Round & Son, Cleveland. Booklet of 32 pages covering 60 years of David Round & Son and its subsidiaries, Cleveland Chain & Mfg. Co., Parker Street Castings Co., Dall Motor Parts Co., all of Cleveland, Krein Chain Co., Wapakoneta, Ohio, Seattle Chain & Mfg. Co., Seattle, Wash., and Bridgeport Chain & Mfg. Co., Bridgeport, Conn. Short biographical sketches of executives of each company are given.

Purite.—Mathieson Alkali Works, Inc., New York. A two-page illustrated leaflet calls attention to the use of Purite by non-ferrous melters who "turn losses into profits."

Copper Steel.—American Sheet & Tin Plate Co., Pittsburgh. In a well-illustrated pamphlet of 18 pages, entitled "The Testimony of Science and Service," the company discusses exposure tests which have been made by the American Society for Testing Materials, upon its "Keystone copper steel" and presents some cases where the material has been used.

Copper and Brass.—Revere Copper & Brass Co., Rome, N. Y. A four-page illustrated leaflet, entitled "The Son of Paul Revere Began with a Chain of Consolidation," gives a brief history of the origin of the company with photographs of some of the founders.

Reversing Motors for Planer Drive.—Reliance Electric & Engineering Co., Cleveland. Booklet 8½ x 11 in., 22 pages, illustrated, dealing with general features of Type T heavy-duty Reliance reversing planer motors for d.c. current. Photographs show typical installations.

Flexible Couplings.—Morse Chain Co., Ithaca, N. Y. Booklet of 23 pages, 8½ x 11 in., illustrated. Installations of Morse flexible couplers are shown and complete list of couplings grouped according to pitch is included. Data for coupling factors is given. Several pages are devoted to general information about coupling problems.

Lock Washers.—Clegg Lock Washer Co., Chicago. Reference sheet 8½ x 11 in., giving general information, list prices, and specifications covering the company's new line of Ded-Lok washers.

Bronze Bushings.—Buckeye Brass & Mfg. Co., Cleveland. Price list covering stock items carried, including both bushings and cored and solid bronze bars. Quantity discount table and standard oil grooves furnished are given.

Pneumatic Die Cushions.—Marquette Tool & Mfg. Co., Chicago. Forty-page booklet, 8½ x 11 in., illustrated, devoted to the applications of pneumatic cushions to stamping presses. Photographs show installations ranging from automobile body to metal dust pan stamping.

Radial Drilling Machines.—Western Machine Tool Works, Holland, Mich. Booklet of 24 pages, 8½ x 11 in., illustrated, showing various machines comprising the "Western Low-Hung Drive" line. Illustrations of construction and operation are included.

Lathes.—Monarch Machine Tool Co., Sidney, Ohio. General catalog No. 131, showing details of various lathes built by the company. Turrets, tool rests and accessories are included. Contains 44 pages.

Bending Machines for Structural Shapes.—Thomas Spacing Machine Co.

Pittsburgh. Bulletin No. 123, four pages, $8\frac{1}{2} \times 11$ in. Describes two sizes of bender, and illustrates other machines in the company's line.

Time-Current Controls. — Electric Controller & Mfg. Co., Cleveland. Four-page folder, illustrating control units for heavy duty on ladle cranes, ore bridges, shear approach tables, dual motor drives, etc.

Arbor Spacing Shims. — Detroit Stamping Co., Detroit. Price list of spacers for milling machine arbors, etc., from 0.001 in. to 0.125 in. in thickness.

Recording Pressure and Vacuum Gages. — Bristol Co., Waterbury, Conn. Catalog 1009 of 30 pages, illustrates and describes a large line of vacuum and recording pressure gages. A 60-page list of charts is added, showing range, pressure, etc., according to size and type of gage.

Flexible Coupling. — Diamond Chain & Mfg. Co., Indianapolis. Sixteen-page illustrated booklet on use and construction of Diamond-Clark flexible coupling, long life for which is claimed because the flexibility is in design rather than material. Illustrations show the coupling consisting of only three major parts, and emphasize the ease of installation and disconnection.

Steel Castings. — Lebanon Steel Foundry, Lebanon, Pa. A four-page pamphlet, entitled "How Lebanon Adds a New Chapter to the Story of Steel Castings," describes a scientifically controlled furnace which quenches and draws the products of that foundry to "new quality."

Silver Solder. — Handy & Harman, 57 William Street, New York. A 20-page illustrated pamphlet describes the proper selection and use of silver solder. Another bulletin, entitled Bulletin No. 3, gives some of the characteristics of silver solder in its 8 pages.

Steel Treating Instrument Data Book. — Brown Instrument Co., Philadelphia. A booklet of 32 pages showing furnaces for all the common heat treating operations, a brief account of the operation, the usual temperature limits, and notes on how recording and control pyrometers have been used to advantage.

Time-Current Control. — Electric Controller & Mfg. Co., Cleveland. Four-page folder, illustrating and describing the advantages of the use of time-current controllers for cranes and hoisting machinery, mill drives and material handling equipment, etc.

Seamless Forged Steel Boiler Nozzles. — Taylor Forge & Pipe Works, Chicago. Four-page folder, illustrating and describing forged steel boiler nozzles made from solid billets without welds or seams, and made in sizes from $1\frac{1}{2}$ in. to 24 in. All types completely dimensioned in Bulletin 29-13.

Optical Apparatus. — Bausch & Lomb, Rochester, N. Y. A 55-page pamphlet describes the various types of projection apparatus produced by this company and gives full details and specifications of each type.

Wrought Iron. — Wrought Iron Co. of America, Lebanon, Pa. A four-page illustrated leaflet, entitled "Wrought Iron Stands the Test of Time," contains an illustration of the old canal lock in eastern Pennsylvania from which a wrought iron bolt was taken after 80 years of service. There is also a picture of the bolt itself as well as a description of the condition in which it was found.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

CURRENT business situation is favorable and needs no artificial stimulation, is the opinion tendered President Hoover by the Business Survey Conference of the Chamber of Commerce of the United States.

* * * * *

EMPLOYMENT has increased since New Year's day, most noticeably in the Central and Western States, said Secretary of Labor Davis. In New York State some 15,000 more hands were working in the clothing and metal trades on Jan. 15 than during December, but this is counterbalanced by a 20,000 decrease in workers in the food, tobacco and minor industries.

* * * * *

TEXTILE manufacturing is depressed . . . Cotton mill activity is at the lowest rate since July, 1926, and Japanese and English mills also have curtailed schedules. A Virginia mill, the third largest in the country, has posted a 10-per cent reduction in wages, effective Feb. 1 . . . It is estimated that 40,000,000 acres will grow all the cotton that will be needed in 1930, as compared to the 48,500,000 acres planted last spring.

* * * * *

RETAIL trade has been stimulated slightly by bargain sales . . . Wholesale dry goods salesmen are sending in good orders for spring delivery, but wholesale and jobbing trade generally is still "fair to poor." . . . Persistently bad weather cut the car loadings to the lowest figure for any week in eight years . . . Breaks in levees on tributaries to the lower Mississippi have dispossessed 1200 families.

* * * * *

LIVING costs, as measured by Department of Labor statistics, were stationary during the last half of 1929, higher costs of food cancelling lower costs of housing and clothing.

* * * * *

FARM implement manufacturers in the Chicago region, and makers of kindred products, are operating nearly at capacity in the expectancy that first quarter's business will equal the corresponding totals for 1929.

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RADIO manufacturing is still very dull. Considerable distress selling has disorganized the retail market, and two well known manufacturers in the Metropolitan area have figured in bankruptcy proceedings.

* * * * *

KING George formally opened the conference "to eliminate the evil results of wasteful competition in naval armaments."

* * * * *

REPARATIONS are believed to have been lifted from the political to the economic sphere by formal acceptance of the "Young plan" by all interested European powers, after 20 months' negotiations. All payments (except to the United States) will be handled by a Bank of International Settlements, located in Switzerland,

but governed by directors representing all debtor and creditor nations. Defaults will be adjudged and penalties assessed by the Court of International Justice. The new and reduced bill requires Germany to pay \$9,000,000,000 within 59 years.

* * * * *

BUILDING trades unions and general contractors institute a conciliation court which will settle jurisdictional disputes without strikes . . . Permits for new buildings in 354 cities have declined from \$4,400,000,000 in 1925 to \$3,100,000,000 in 1929. Permits for skyscrapers in New York, however, increased from one-eleventh of the total in 1925 to one-fifth of the total last year . . . Chicago building in 1929 was about 40 per cent lower than the 1925 to 1928 annual rate, and residential vacancies are now less than 5 per cent. A muddled tax situation, low rentals, and scarce money for second mortgages are expected to retard needed building this summer . . . Sears, Roebuck & Co. has organized a department to build and finance on instalments "ready-cut" houses for any purchaser who can make a 25 per cent down payment.

* * * * *

CHICAGO'S credit has been exhausted. A floating debt of \$185,000,000 exists, wages are 6 weeks in arrears, and unpaid coal bills are so large that further deliveries have been refused. A citizen's committee has offered to buy \$20,000,000 of tax anticipation warrants if this sum is spent under direction for schools, hospitals and fire and police protection . . . W. R. Hopkins, for many years city manager of Cleveland, has been ousted by the council for "usurpation of powers" . . . Governor Larson of New Jersey receives an investigator's report to the effect that a private business with as many cumbersome and overlapping agencies would become bankrupt within a year.

* * * * *

TELEPHONE rates are increased 25c. to \$1 per month, depending on class of service, by New York Telephone Co., on the claim that this is necessary to return the authorized 7 per cent net income on its valuation plus \$133,000,000 for expended or anticipated increases to plant . . . Radio tube research and manufacturing activities of Radio Corporation, General Electric and Westinghouse are united in a firm known as R. C. A. Radiotron Co. . . . The recently formed Imperial & International Communications, Ltd., of Great Britain, with capital stock of £30,000,000 is viewed with alarm by C. H. Mackey of the Postal Telegraph Co., but with equanimity by Newcomb Carlton of Western Union.

* * * * *

C. C. HATRY, the British financier whose failure cost his creditors \$67,500,000, pleads guilty to fraud and is sentenced to 14 years hard labor.

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